

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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SYSTEM	IBM 3031	IBM 3032	IBM 3033N	IBM 3033
CHARACTERISTICS				
Performance	54	124	192	223
Memory Size in Bytes (Minimum to Maximum)	2M-6M	2M-6M	4M or 8M	4M-8M
Purchase Price (Memory Size)	\$800,000 (2M)	\$1,642,000 (4M)	\$1,800,000 (4M)	\$2,870,000 (4M)
Monthly Lease (Lease Term)	\$26,681 (4 Years)	\$52,160 (4 Years)	\$55,000 (4 Years)	\$73,900 (4 Years)
Memory Cycle Time (Nsec)	345	320	Not Available	285
Machine Cycle Time (Nsec)	115	80	57	57
Channels (Minimum to Maximum)	6	6-12	6-12	12-16
Cache (Buffer) Size	32K	32K	16K	64K
Price Per 1M Byte Of Main Memory	\$50,000	\$50,000	\$50,000	\$50,000

Where IBM 3033N Processor Fits

ACM Head Reflects on Software

Cobol No Panacea for Rising Costs

CHICAGO — Cobol is not going to disappear, but neither it nor any other conventional programming language currently in heavy use is going to solve the problem of spiraling software costs and the unhappy interface between DPs and end users.

There are tools available and coming into more prominence that will go a long way to solving the problem and

easing the interface, according to consultant Dan McCracken.

Taking time out from his duties as president of the Association for Computing Machinery (ACM), McCracken told a session at the annual trainers' conference sponsored by Advanced Systems, Inc. (ASI) that application packages in general make up one of those tools. Data base management systems (DBMS) with high-level query facilities make up another.

Though his talk was entitled "What if Cobol Disappears?" McCracken said that certainly will not happen in the foreseeable future. Too much is already committed to the language, and the retraining needed to put programmers on another track creates "an enormous inertia" for any move in that direction.

The problem with Cobol, of course, is that it takes time to write programs today. DPs do not really like the language, and end users do not like any programming language. As a result, there is typically a two-year backlog of work waiting to be done, he said.

Programmers can learn to do a better job than they are doing today, he continued. Structured programming — "almost regardless of what your definition of that term is" — can help. But if someone is using the wrong tool, "it doesn't really make any difference how efficient it is."

Setting out to measure programmer

productivity can create problems that never existed, according to McCracken. He cited the case of the programmer who was seen sitting with his feet up on his desk: is he thinking instead of coding?

Application packages and the installations that use them came in for high marks from McCracken. He pointed

(Continued on Page 8)

ACM Committee Cites Lack Of University DP Programs

By Brad Schultz

CW Staff

DETROIT — The U.S. lacks a sufficient number of university programs in data processing, according to a draft report of an Association for Computing Machinery (ACM) committee.

A survey of U.S. academic programs oriented toward producing applications programmers, information systems (IS) specialists and data base managers found that about one-fourth of bachelor's degree programs and more than one-third of master's degree programs do not meet curriculum guidelines ACM presented in 1972 and 1973.

The ACM Curriculum Committee for Information Systems is still deliberating on the final form of its report,

Memory prices were also cut for the entire 370 line including the 115, 125, 138, 148, 158 and 168. Furthermore, the memory prices for the 3704 and the 3705II communications controllers were similarly reduced by 33%.

Emphasis on Purchase

By reducing purchase prices without reducing the lease rates for the systems, purchases become more attractive to users, industry analysts note, and IBM adjusts those figures when it wants to emphasize either leases or purchases.

In the past year, leasing has become much more prevalent than in the past, causing a slip in IBM earnings growth since lease revenues are deferred while purchase revenues are immediate. This latest move may be a way of boosting earnings.

At the same time, however, analysts note that IBM tries to "clear the boards" with such purchase price reductions before entering new product lines into the market. Since the H series is expected early next year, IBM could be trying to reduce the inventory of 370 and 30 machines before that announcement, they said.

'Newport' Machine

The new 3033 Model Group N processor (the "Newport" machine), announced along with the price cuts, comes in either a 4M-byte version or an 8M-byte version, the firm said, and features a cycle time of 57 nsec.

The units have 30% to 80% more processing power than the 3032, the firm said, and have roughly 10% less processing power than the smallest pre-

(Continued on Page 2)

Logic Chips, Not Memory, Delaying H

By John Rhea
And E. Drake Lundell Jr.

CW Staff

NEW YORK — Possible problems with the yields of logic, not 64K memory, chips may have caused IBM to delay the announcement of the H series of computers for up to a year.

In fact, IBM has never intended to use the 64K chips produced at its Essex Junction, Vt., facility and in Singelfingen, Germany, for the H series of computers, according to IBM sources.

Computerworld last week may have left the impression that problems with the 64K chips were the reasons for a possible delay in the H series announcement.

(Continued on Page 8)



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Enhances CICS-Total Interface Cincom Releases Update of T-Ask

By Don Leavitt
 CW Staff

CINCINNATI — Cincom Systems, Inc. has announced a new release of its T-Ask on-line query facility, a significant enhancement to its CICS-Total interface and plans to introduce a series of integrated financial application programs.

Using its semiannual users meeting as a forum, the vendor also spelled out and demonstrated the capabilities of the Mantis end-user programming package that it announced two weeks ago [CW, Oct. 29] and reported that both T-Ask and the Total data base management system (DBMS) have been adapted to new environments.

T-Ask was introduced several years ago as a query facility to be used with Total. As other query languages do, it enables users to build procedures to handle ad hoc problems or catalog established routines so they can be invoked and used repeatedly.

Release 8.1, introduced at the user meeting, includes task-level recovery, Viam support, a time accounting facility and some recoding to improve overall performance. The update also enables users to access more information with a single query.

The number of files that can be queried at any time has been increased sharply. The number of elements on a single file has been increased from 27 to 256, and the logical record built to handle a single query has been expanded from 512- to 4,096 bytes.

Enhanced CICS Support

Cincom considers its enhanced CICS support to be a significant change in its posture and philosophy. It has supported basic linkage between CICS and Total for some time, but the Dynamic Transaction Backout (DTB) facility introduced last week ensures data integrity and automatic restart/recovery, he said.

This kind of support is a change for Cincom, which until now had put almost all of its teleprocessing enhance-

ment efforts into linking Total and the company's own monitor, Environ/1.

The Mantis demonstrations showed that, as a language, it includes integral CRT screen-mapping facilities, tools for screen manipulation, data entry and editing and the ability to track data movement to and from data storage locations.

Mantis operates as a task under CICS, and less than 30K bytes are required to support a network of IBM 3270-type terminals in a fully reentrant implementation. Procedures are written in executable pseudo-code including high-level verbs for data movement to double-precision floating-point arithmetic and statistical functions, the spokesman said.

Although Total has been transported to nearly 20 different operating environments, Cincom appeared especially pleased that it has implemented the system on both Digital Equipment Corp. VAX machines and Prime Computer, Inc.'s CPUs from the 350 up.

The DEC implementation of T-Ask will be officially announced Jan. 15, but it is available now for current DEC Total users. It is geared to run on PDP-11s from the 34 through the 70 under

either RSX-11M or RSTS/E.

Cincom's announcement of plans to introduce financial accounting packages tends to set the company off in a new direction, begun last year with the introduction of manufacturing support packages. The financial packages were developed in Sweden by Euroc AB and can be interfaced with various data base/data communications systems.

The applications will ultimately run on IBM, Honeywell, Inc. and Univac equipment and cost approximately \$50,000 apiece, the spokesman estimated.

He added that the cost of T-Ask 8.1 is \$27,800 or \$695/mo for installations running under DOS/VS and \$30,000 or \$750/mo for those running under OS/VS. The cost of the Total package intended for the VAX-11 is \$22,000 or \$700/mo, and the DEC T-Ask is \$12,000 or \$300/mo.

Mini packages have installation fees, as well. For the DEC T-Ask, the price is \$750; for the VAX-11 Total, the price is \$1,500.

Cincom is at 2300 Montana Ave., Cincinnati, Ohio 45211.

IBM Cuts Prices, Adds CPU

(Continued from Page 1)

vous 3033 uniprocessor.

They can be upgraded in the field to the 3033 uniprocessor capability or to a 3033 attached processor or multiprocessor.

Six channels are standard on the units, including one byte multiplexer and five block multiplexers. Six additional channels of the same mix are available.

First customer shipments of the Model Group N processors will be in the first quarter of 1980 and the upgrades to higher 3033 capabilities will be available in the first quarter of 1981, the firm said.

Purchase price for a unit with 4M bytes, six channels, a 3036 operator's

console and a 3037 power/cooling unit is \$1.8 million, and the monthly lease price is \$55,000 under a four-year contract. Rental rate is \$60,500/mo.

Word Processing Entry

At the same time, the firm's General Systems Division entered the word processing market with announcement of the 5520 Administrative System featuring text-editing terminals.

Aimed primarily at in-house electronic mail systems, the unit can handle from six to 18 workstations.

The system can communicate with 370s or the Office System/6 unit from the firm's Office Products Division through communications lines.

This Week

NEWS

- Computing Professionals Urged to take Stands . . . 4
- FCC Challenged to Create Policy Environment . . . 5
- DPers Commended in Smoothing Papal Visit . . . 6
- University Develops 'American Dream Machine' . . . 7
- Society for 'Illiterate' Programmers Established . . . 8
- Clinic Suing Software House for \$4.5 Million . . . 9
- FCC Still Unsure of Separate Bell Subsidiaries . . . 10
- Music Pioneer of '60s Ready to Take On '80s . . . 11
- GAO Report Cites Poor DP Management . . . 12
- Astronauts to Sport MPU-Controlled Suits . . . 13
- FBI Criticized for Management of DP . . . 14
- Are You Listening, Gloria Steinem? . . . 15
- DP Crime Seen Hitting New Heights in 1980s . . . 17
- Managers on the Move . . . 20
- System Helps Detect Cause of Power Outages . . . 22
- In Depth: The Changing Face of DP Training . . . 24

EDITORIAL

- Editorial: Obsolescence . . . and the Future . . . 32
- Human Connection: Office Systems Planners? . . . 33
- Users Should Avoid All Cobol GOTOs . . . 34
- Office of the Future: More Than New Technology? . . . 38
- Taylor Report: Cobol: How Structured? . . . 35

SOFTWARE & SERVICES

- 'Combine Requirements, Opportunities' . . . 41
- 'Control/SMF' Helps Manage IBM Data Centers . . . 42
- Vault Management Enhanced in 'UCC One' . . . 44
- DBMS Helps Bring Promise of MIS to Fruition . . . 45

COMMUNICATIONS

- Resource Management System Introduced . . . 49
- Portable Devices Reported 100% Reliability . . . 51
- Tektronix Terminals Get Access to Design Tools . . . 55

SYSTEMS & PERIPHERALS

- Supermini Fuels Synthetic Gas Research . . . 57
- Switch to In-House System Saves \$1,000/Mo . . . 58
- Thanks to Monitor, User Cuts Response Time . . . 58

MINIWORLD

- Mini Helps Court Speed Judicial Process . . . 65
- Controller Lets Printers Link With PE Processors . . . 66
- Small System Trims Hotel's Costs \$1,000/Mo . . . 70

COMPUTER INDUSTRY

- PCMs Seen Playing Catch-Up With IBM . . . 73
- Nasco Gets Moderate Management Style . . . 73
- Sanders-Calcomp Merger . . . 74
- Manufacturers Form Industry Group . . . 75
- Blankenship to Lead Adapso Next Year . . . 76



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Computing Professionals Urged to Take Social Stands

By Brad Schultz
CW Staff

DETROIT — Computing professionals must take positions on some classic social controversies if they are to apply systems well in the 1980s.

In the coming decade, users and vendors should not ignore such issues as security, government intervention in the private sector, the social mission of academia, the demographic consequences of decentralizing corporations and inflation, according to Paul S. Mirabito, who addressed the Association for Computing Machinery (ACM) last week.

"As more and more data flows into computerized files, the problem of security becomes increasingly apparent," the Burroughs Corp. chairman observed. "Data needs to be protected not only from casual error, but from unauthorized access and from improper disclosure."

Laws addressed to computer fraud and privacy violations already exist or will exist soon, he noted. A federal law, the Foreign Corrupt Practices Act, holds officials of publicly owned companies personally responsible for implementing internal auditing controls to ensure valid financial statements.

"Of all available security [methods], from locks on the computer room door to access codes and encryption, one of the best is auditability," Mirabito said.

"A clear, complete, tamper-proof audit trail is a powerful guardian. A higher level of protection is possible when auditors are able to employ independent computer inquiry and testing procedures," he added.

Voluntary Standards

Turning to another issue for DP professionals, Mirabito took a dim view of Federal Trade Commission (FTC) proposals to regulate voluntary standards organizations such as the American National Standards Institute.

FTC intervention would complicate and prolong standards development, the Burroughs chairman maintained. The FTC might even make such voluntary organizations liable for the effects of new standards, he speculated.

Mirabito, addressing DPers who

agree that government should not intervene in voluntary standards development projects, said, "Express your opinions promptly and forcefully."

Contradictions between state and federal regulations have limited the adoption of electronic funds transfer (EFT) systems, Mirabito charged. As a result, the public has not reaped the full benefits of EFT.

Government regulation seems especially dubious as history's longest antitrust trial, the U.S. vs. IBM, drags on, Mirabito continued. The trial "may very well fail to determine whether size alone automatically connotes undue advantage."

Federal attempts to define a distinction between communications and computing seem misguided as data communications systems inexorably proliferate, Mirabito suggested. Nevertheless, the distinction is made by some parties concerned with the proposed revision of the 1934 Communications Act and the Federal Communications Commission's (FCC) Second Computer Inquiry.

"Fundamental, understandable and workable rules of fair play" are needed, Mirabito said. But "arguments can be heard and decided upon more efficiently in the forum of the market-

ACM Cites Dearth of DP Programs

(Continued from Page 1)

places. In contrast, departments addressed to computer science generally select from "three or four" distinct names.

The two most common names associated with the field examined by the committee were "management information systems" (27 of the 124 programs) and simply "information systems" (18 programs). The team of six academics and one IBM employee settled on IS as a working description.

The IS field integrates systems analysts, statistics, management science, accounting, economics, finance, marketing, production and computer and communications technologies, Nunamaker said.

The U.S. has nearly five computer

Bostonian Accused of Stealing IBM Trade Secrets

BOSTON — State police here last week arrested a local man accused of stealing IBM trade secrets and attempting to sell them to Control Data Corp.

David P. Grigalunas, a 29-year-old office manager for Charles River Associates, a Boston consulting firm, was arrested by state police after an investigation of several weeks.

A spokesman for IBM said the firm had no comment on the matter. However, CDC issued the following statement:

"We were informed by the Massachusetts State Attorney General's

office that an arrest had been made Tuesday night of a person alleged to have attempted to sell to CDC certain confidential information about IBM Corp.

"CDC was approached by an unknown person on Oct. 17, who offered to sell unspecified confidential information. CDC promptly informed IBM. The Massachusetts Attorney General's office was also informed. It is the policy of CDC not to solicit nor to accept information from unauthorized sources."

Charles River Associates personnel refused to discuss any details of the case.

place than in the courtroom."

Turning to the relationship between universities and DP, Mirabito pointed out that few universities contribute to applied DP research. Instead, academics tend to concentrate on computer science — "Basic" research generally funded by government grants.

The private sector should subsidize applied DP research projects at universities, Mirabito said. "It is time for our great academic community to realize that DP is an essential industry, and that America's continued leadership in DP requires their interest and sup-

port," he said.

Another issue before computing professionals as the 1970s draw to a close is what happens when large corporations radically upgrade processing resources.

"Millions of gallons of gasoline are presently being wasted each day in transporting information — that is to say, people — between home and office," he added. "Electronic communication has the potential for transporting information at a fraction of present costs in time and energy consumption."

science departments for every IS department, according to a recent study not connected with the ACM investigation.

Higher Demand

Nevertheless, the nation has a much higher demand for personnel such as IS graduates, who have a combination of technical and organizational skills, than for computer science graduates with "solely" technical skills, Nunamaker indicated.

The shortage of people with organizational training has triggered a migration of people with heavy technical but virtually no organizational training into jobs that call for extensive organizational expertise, the committee report stated.

"This mismatch creates problems in the analysis and design of information systems," the report warned.

Student Types

According to the report, IS programs attract two main types of students: those who wish to use computer systems as they prepare for general management positions and those who see IS as a lifetime career.

Computer science students tend to have different interests, Nunamaker emphasized. Few of them transfer to IS programs when their university makes that alternative available.

IS graduates usually start their careers as one of the following:

- An information systems manager, who defines data requirements, manages programmers in implementing a system and interacts with other managers to solve administrative, scientific and business problems.
- A systems analyst/designer, who evaluates proposed systems, prepares hardware and software specifications and designs new systems.

- An applications programmer.

- A data base administrator, who maintains a dictionary of data definitions, assists data base design efforts, ensures data base security and advises on how to use a data base.

- A communications analyst, who aids implementation of distributed systems, manages the DP telecommunications interface and must stay apprised of developments in both technologies.

- A systems librarian, who maintains the files that support an organization's IS.

With those six job descriptions in mind, ACM published recommended curricula several years ago for both undergraduate and graduate levels.

The report Nunamaker discussed at the ACM conference assessed whether 69 baccalaureate and 52 master's programs purporting to teach IS actually met the ACM standards. In its preliminary form, the report did not evaluate the 27 doctoral programs in IS it identified.

The committee decided that 52 of the 69 bachelor's programs and 34 of the 52 master's programs met its criteria. Of the 52 satisfactory undergraduate programs, 42 were components of business or management colleges; the remaining 10 were offered by computer science departments or engineering colleges.

Of the 34 satisfactory master's programs, 25 were in business or management colleges and the rest were in computer science or engineering.

The curriculum committee found that 89 U.S. colleges and universities offer some form of IS study course. Many of those schools offered more than one program at different levels. A number of schools did not cooperate with the committee's survey, Nunamaker pointed out.




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FCC Task: To Create New Policy Environment

By Phil Hirsch

CW Washington Bureau
WASHINGTON, D.C. — Because of "further and perhaps significant delay" in introducing its Advanced Communications Service (ACS), AT&T has withdrawn a petition submitted several months ago to the Federal Communications Commission (FCC) seeking authority to build the system.

AT&T general attorney Alfred A. Green, in a letter to the commission, indicated the ACS software development problems, which the company announced last February, are continuing. "In addition, recent developments in state-of-the-art hardware make it desirable to modify the system," he said.

Another reason for delay, apparently, is the FCC's Second Computer Inquiry, which has not yet produced a final ruling. One of the key questions in that inquiry is whether AT&T can legitimately offer DP services. Computer systems and services vendors insist that ACS is primarily a data processing and not a communications offering.

Satellite Business Systems (SBS) has submitted an "informational" tariff to the FCC describing in detail the services, but not the rates, it plans to offer next year when it hopes to begin operation as a communications carrier.

SBS is still not certain the hope will be realized, however; the authorization the commission granted it last year is being contested by the Department of Justice and prospective competitors in a case pending before the U.S. Court of Appeals.

SBS plans to employ all-digital satellite transmission in the 14- and 12-gHz bands. Its network has been designed to integrate voice, data and image traffic into a common digital format that would be delivered via 5- or 7-meter earth stations installed on the customer's premises.

Revised Legislation

Sen. Harrison H. Schmitt (R-N.M.) told a recent meeting of the Computer and Business Equipment Manufacturers Association (Cbema) that he and Sen. Barry Goldwater Sr. (R-Nev.) will, within the next few weeks, introduce a revised version of the communications policy legislation (S. 622) they drafted several months ago. But additional subcommittee hearings and at least one more session of Congress will be needed to update the Communications Act of 1934, he added.

Schmitt also said it is mandatory to create a new policy environment for telecommunications. The present system of "regulated competition" leads to market allocation and discourages innovation.

Schmitt charged that the FCC lacks a systematic way of dealing with critical issues such as the relationship between computers and communications. He said the commission provides only "ad hoc responses" instead — an apparent reference to its tentative decision in the Second Computer Inquiry.

Meanwhile, in the House, efforts are under way to come up with a limited revision of the '34 Communications Act that may be passed and sent to the floor by the end of this year. The new strategy was unveiled recently in a speech by Rep. Lionel Van Deerlin (D-

Calif.), chairman of the House Communications Subcommittee, at a meeting held by the U.S. Independent Telephone Association [CW, Oct. 29].

At press time, some subcommittee members reportedly were planning to introduce limited bills. Meanwhile, the subcommittee was holding a series of "informational meetings" aimed at producing a consensus.

Senior members of the House Post Office Committee believe that efforts by the telecommunications world to "preclude postal service involvement in electronic communications systems" are "ill-advised," according to

Michael F. Cavanaugh, a committee staff member.

Speaking to a recent meeting sponsored by the Information Industry Association, Cavanaugh contended that commercial vendors of electronic message systems (EMS) and services are trying to keep the postal service off their turf until EMS terminals are installed in a substantial number of homes and offices. The industry's ultimate goal, he added, is to make the postal service an "anachronism," except as a "last resort."

Cavanaugh suggested that this competition, in addition to being coun-

terproductive, is unnecessary. "The significant impact [of EMS] is years away ... we have plenty of time to carefully consider the broad issues involved."

Bell Offering

Bell Telephone Co. of Pennsylvania contends that a recently tariffed "magnetic disk storage and retrieval service" is beyond the FCC's jurisdiction and thus does not violate the commission's computer rules as charged recently by DP terminal manufacturers [CW, Sept. 24].

Bell pointed out that the FCC's jurisdiction extends only to interstate communications services and facilities. The new offering can be used only on intrastate circuits.

Communications Update

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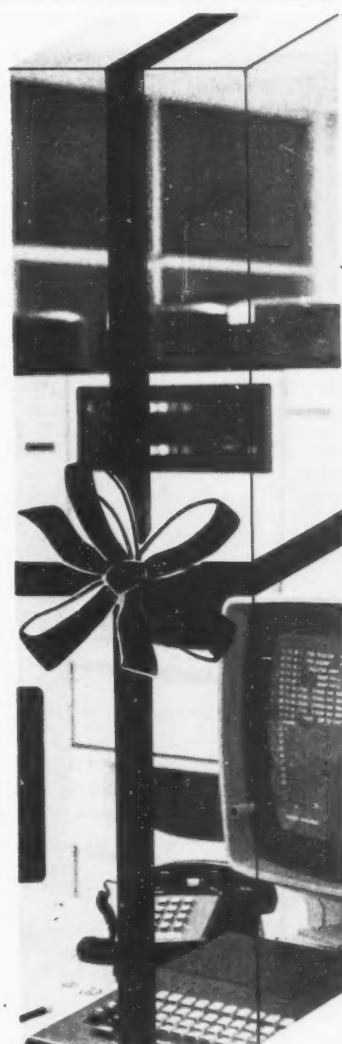
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DPers Commended for Smoothing Papal Visit

By Jeffrey Beeler

CW West Coast Bureau

DES MOINES, Iowa — Gov. Robert Ray has awarded state DPers a special commendation for their role in smoothing the way for Pope John Paul II's recent visit here.

Ray cited the DPers for their help in developing a makeshift system of microcomputers said to have greatly eased administrative preparations for the pope's Oct. 4 visit.

The system, which was installed especially for the occasion and later dismantled, was developed and operated entirely by volunteers, none of whom learned of the pontiff's visit until about three weeks before his planned arrival.

Working feverishly in their spare time, the volunteers defined their data

base requirements, gathered data, wrangled hardware wherever they could find it and sometimes stayed up as late as 4 a.m. modifying the system's programs. The project nearly drove its participants to distraction at some points, but they finished their work on time.

The resulting system performed "exceedingly well," according to Richard Skeie, secretary and treasurer of the Computer Emporium, the local computer store that supplied the hardware.

"We even heard comments that Des Moines was better organized than any other place on the pope's U.S. itinerary," he added.

Central Location

Skeie credited much of the hastily assembled system's success to the deci-

sion to locate it at one central site. Community coordinators had originally planned to develop the configuration in local Bishop Maurice Dingman's house and then, when finished, transfer it to the nearby Living History Farm museum, where the pope was scheduled to celebrate mass.

The system worked so well, however, that they abandoned their plans and instead kept the equipment in Bishop Dingman's living room, which served as a temporary command post for Colonel Harold Thompson's Iowa National Guard.

Conceived by Patricia Croat and Michael Burgus, computer operator and programmer/analyst, respectively, with the state's Social Services Department, the system incorporated 48K-byte Apple Computer, Inc. processors, each with a Centronics Data Computer Corp. 779 printer and two 116K-byte floppy disk units.

Data Base Listings

As part of their assignment, the 13 CPUs maintained a data base listing all the area's available parking lots, their locations and the approximate number of cars each lot could hold. From this information, local coordinators then assigned parking spaces to the nearly 400,000 visitors, well-wishers, Secret

Service agents and religious officials who gathered here to greet the pope.

The system also helped area officials arrange housing for visiting bishops and priests and maintain a directory of all the reporters authorized to cover the papal visit.

Although all the system's applications theoretically could have been performed by hand, manual processing "would have required 10 times more manpower than a computer system," Skeie said. "With manual methods, it would have been cumbersome, if not impossible, to regurgitate lists over and over again, add to them and have the updated versions come out right each time."

One of the most serious obstacles the developers faced in configuring the system was finding the necessary hardware. With orders for Apple computers perpetually backlogged, the volunteers had to "scrimp and scrape" and even divert some existing orders to obtain enough CPUs for an adequate system, Skeie stated.

For the most part, software rewrites posed only a minor problem for the DPers, Burgus added, although they did have to reprogram the system to accept the Centronics printers and to boost the diskette units' storage densities.

IBM Experimenting With CCD Technology

By E. Drake Lundell Jr.

CW Staff

EAST FISHKILL, N.Y. — IBM is experimenting with 64K charge-coupled devices (CCD) here for possible use in "solid-state" disks that may replace fixed-head disks in H series applications.

While IBM does not speculate on future products, documents introduced in the U.S. vs. IBM antitrust suit show that IBM had been buying 64K CCDs and CCD technology from Texas Instruments, Inc. throughout 1978 and through the first half of this year.

At the end of the program, IBM was scheduled to have inhouse CCD production capabilities.

While there is doubt among some industry analysts about the usefulness of CCDs, there was agreement last week that if they are used at all in the memory hierarchy it will be as volatile, intermediate storage between either floating-head disk or bubbles and the main memory of the system, which today is based generally on random-access memory (RAM) technology.

Sources at IBM indicated the development labs here have been using the TI CCDs to develop a "file pack."

Several independent firms have already announced disk replacement systems using semiconductor technology. These firms include Intel Corp., Storage Technology Corp. and Memorex Corp.

The CCD devices are not thought to be useful for direct main memory applications because of their volatility; when power is lost, the data is lost.

However, because CCDs are faster than either bubble memories or fixed-head disks such as the IBM 2305, many observers feel they would be ideal for intermediate transient storage, particularly in virtual systems with high-paging environments.

In this way, CCDs act essentially as caches for floating-head disk units.

IBM has long pushed the concept of hierarchical memory systems with RAM as main memory and — up until now — with fixed-head disks, floating-head disks and tapes making up the rest of the hierarchy.

With the purchase of the CCD technology from TI, several industry observers last week indicated IBM may use the CCD devices as the intermediate step between the RAM main memory and the disks.

Organizers of NCC 1980 To Trim Technical Program

By Jeffrey Beeler

CW West Coast Bureau

SAN JOSE, Calif. — Organizers of next year's National Computer Conference reportedly plan to trim their technical program in an attempt to avoid the shallowness and amateurishness that were said to have characterized some of the 1979 show's sessions.

NCC's 1980 installment in Anaheim, Calif., will boast only about 100 technical conferences, compared with 152 such sessions at the most recent show in New York City, according to Dr. Albert Hoagland, who last July began his second term as president of the American Federation of Information Processing Societies (Afips).

Hoagland, who also directs the magnetic recording operations at IBM's Research Laboratory here, disagrees with critics who say NCC's technical program could be improved by plowing more of the show's earnings back into the sessions.

Such a tactic would serve no purpose, he said, for the simple reason that all NCC speakers volunteer their services free of charge.

Quality, Not Quantity

Hoagland also disagrees with the view that the NCC technical program should expand to keep pace with the show's rapidly growing product exhibit. Enlarging the conference "would make no sense" and would do nothing to strengthen session content.

The surest way to achieve the desired improvement, Hoagland said, is to strive for quality rather than quantity in the selection of session topics. A few meaty, well-chosen conferences that explore their subjects in depth are by far preferable to programs that gloss over some topics in an attempt to ad-

dress every possible DP interest, no matter how obscure.

With that principle in mind, NCC organizers have already vowed to strip the 1980 show of its "marginal" sessions, although exactly which topics they plan to drop remains to be seen, the Afips president added.

Looking back at this year's NCC, Hoagland neither defended nor unduly criticized the conference's much maligned technical program.

"I don't think the quality of the sessions was way out of line for such a show, but we could have done better," he said. "The New York conference taught us a great deal that should work to our advantage in 1980."

"My main concern now," Hoagland added, "is that we are sensitive enough to some of the criticisms about the 1979 show so in 1980 people won't be faulting us the same way."

Changed Circumstances

Some years ago, when computer conferences weren't nearly as common as they are today, NCC provided a forum for nearly all the original and advanced work then taking place in the DP field, the Afips head recalled.

Now, however, the situation has changed dramatically. The number of technical specialties within the industry has grown so large that no single conference program can reasonably be expected to cover all of them thoroughly.

As a result, many of the developments now being pioneered in the field no longer get presented at the large omnibus shows like NCC, but instead appear at the much smaller, specialty conferences, many of those activities are geared exclusively to the interests of a single technical subdiscipline.

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University Develops 'American Dream Machine'

CINCINNATI — The dream of many DP installations is to have one job stream that handles most of the work of most of its users, is adaptable to change without massive rewriting and is reliable as well.

At the American University here, the DP staff took the time and applied the effort needed to create such a system. It has worked so well, it has earned the nickname "American Dream Machine."

Identified formally as the General Maintenance System (GMS), it enables more than 25 user offices to maintain the university data base. Despite its generalized approach to the problem of data base maintenance, GMS allows each office to have its own customized input formats and data edits, according to analyst James D. DeRocher.

The data's ownership, security and printed output are maintained separately for each user, even though the input data is mixed in a single data stream. While it is complex, GMS has been extremely reliable, DeRocher said in a technical session at last week's meeting of Total data base management system (DBMS) users.

With nearly 100,000 lines of Cobol code, DeRocher said, GMS has abided as a result of logic errors only 14 times in more than 400 runs. It has withstood a 150% expansion of the original code, including the massive changes needed when batch control logic was added two years after the system was first installed.

The designers have every intention of having the system last "at least till the year 2000" and feel that the concepts behind this great American Dream Machine can prove useful to other installations as well, he stated.

GMS came about because the university's DP staff did not like what it had to offer its users. The existing systems all had the classic programs — edit, sort and process — and the classic problems. Processing stopped until input errors could be corrected, and there was no clear control over the different update runs.

In place of that pattern, the university envisioned a system with only one edit program, one sort program and one process program. Finally — and, in DeRocher's view, most importantly —

there would be only one data base to service everyone's needs.

Six Programs

GMS consists of six programs. The first takes all the new input data, consisting of new transactions and error correction transactions, and checks for batch control information. Any new transactions not associated with such information are put on a suspense file for further investigation.

The program generates batch information for the corrected transactions resubmitted with this run, DeRocher said.

The second program in GMS takes the transactions that passed the batch

edit and prepares them for the individual transaction edits, which are controlled by the third program in the American Dream Machine.

The structure of this third edit program is directly comparable to the "motherboard" scheme common today in microprocessor hardware, DeRocher explained. The mainline of the program contains only the Cobol CALL statements needed to route transactions to the actual editing subprograms.

The fourth program in GMS is the sort. It takes the transactions that passed the edit and sorts them into the optimal physical processing sequence based on a sort key made up of five

parts. The sort key is appended to the front of the transaction for the duration of the sort.

The fifth program processes the sorted transactions and is again built on the motherboard concept, with CALLs to specific process subprograms making up the mainline. Once a transaction is passed to the apparently appropriate subprogram, it is reedited.

The sixth program in the system routes both general and specific reports back to the user. The general reports include a page of system news that alerts users to enhancements or problems. The specific reports are the requested applications and system use statistics, DeRocher said.

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Memorex Rejects STC Merger Plan

LOUISVILLE, Colo. — Memorex Corp. has rejected Storage Technology Corp.'s (STC) merger proposal a second time, despite an improved merger offer of 1.75 shares of STC common stock for each outstanding share of Memorex common stock.

The rejection of the improved offering signaled the end of any further offers by STC, according to STC President Jesse I. Aweida.

In the meantime, Memorex is continuing merger discussions with Amdahl Corp., although Memorex's board of directors decided that the previously proposed exchange rate of 1.2 shares of Amdahl common stock for each share of Memorex common stock was not acceptable.

Society of 'Iliterate' Programmers Established

By Jeffrey Beeler

CW West Coast Bureau

Many computing professionals would sincerely like to upgrade their job skills but hesitate to do so because of widespread ineptitude among their colleagues and because DP organizations often encourage substandard performances.

As a result, many computing personnel eventually abandon their plans for professional self-development and are forced instead to become as incompetent as many of their peers, according to Gopal Kapur, president of Kapur & Associates, Inc.

Although many established associations of DP professionals have attacked the problem of deficient job skills, their efforts have met with little success thus far, primarily because their findings often languish in overly stodgy, abstract and academic society journals.

With most of the existing trade associations seemingly unable to combat computing incompetence, Kapur and some of his colleagues decided to take an unconventional approach to the problem and created their own society, called the International Personhood of Iliterate (sic) Programmers.

Laughter as Tool

Like the more established professional groups, the new society seeks to further its members' DP education and promote a high level of computing competence throughout the industry. But unlike most other associations, the infant group aims to achieve its ends, not through serious scholarship, but through purposeful humor, satire and, in some cases, outrageous pranks.

Much of the group's energy will eventually be devoted to collecting samples of user programs that, in the founders' view, best illustrate the principles of incompetent coding, Kapur said. All the samples will be bona fide programs from current user installations, and the most asinine examples will be showcased in the group's peri-

odic "Journal for Iliterate (sic) Programmers" (Jip).

Pay for Mistakes

Alongside each program, "Jip" will provide an editorial comment explaining its flaws and suggesting possible improvements. "We would never reveal the identity of a program's owner because names are immaterial," Kapur said. "But if the offending owner wants to claim the program, we'll award him a certificate for having learned from his mistake. Of course, he'll have to pay \$5 to collect the prize."

At the end of each year, the group will rate its collected programs for posterousness and then present the winner with an "Iliterate of the Year Award."

Although one objective of the society's admittedly unconventional methods is simple entertainment, the

main purpose is to expose and thus eradicate DP incompetence wherever it exists, according to George Glaser, president of Centigram Corp. and one of the group's charter members.

But to succeed in such a serious undertaking, the association must first persuade its intended audience to listen. "There's a good reason for our iconoclastic humor," the Centigram president said. "We're not doing it to be smart alecks."

As the intentional misspelling in its name suggests, the "half-serious, half-flaky" society formed partly as a reaction to the computer industry's "notorious lack of humor" and partly as a foil to the many DP professionals who "have an outrageously disproportionate sense of their own value," Glaser said.

Three Members

The group currently consists of just

three members: Kapur, its president; Chickering & Gregory attorney Susan Nycum, its vice-president; and Glaser, its treasurer. But the search has already begun for six industry "luminaries" to fill the remaining vacancies on the board of directors; and when the group incorporates as a tax-exempt, nonprofit organization, the hunt for general membership will start in earnest.

Although its name might suggest otherwise, the association is open to computing professionals of every stripe and not only to programmers.

DPers interested in joining the International Personhood of Iliterate (sic) Programmers can write to Gopal Kapur at Kapur & Associates, 776 El Cerro Blvd., Danville, Calif. 94526. All requests for membership application forms should include a stamped self-addressed envelope.

Logic Chips Responsible for H Series Delay

(Continued from Page 1)

Government attorney John Chapman indicated during the U.S. vs. IBM trial recently that H might be delayed because of problems with the yields of the "Purdue"-type logic chips. His comments were made during the cross-examination of Eric Bloch, an IBM research official.

The Purdue logic chips are used in the System/38, 4331 and 4341 computer systems. The units contain 704 circuits and have a speed that ranges from 3 nsec to 6 nsec.

The units are made as a "masterslice" that is then customized using electron-beam etching to perform their specific functions. The possible problems with the circuits alluded to by Chapman were not defined since the court record was sealed at that point at the request of IBM.

The only "problem" with the 64K circuits was that IBM underestimated the demand for the 4300 series of com-

puters, according to Dr. Edward M. Davis, vice-president of the firm's General Technology Division in Essex Junction.

Because the demand was not gauged correctly, the firm has had to turn to outside memory suppliers for 16K chips in order to step up shipping rates on the systems.

Documents made public at the trial indicate that IBM will purchase at least four million of the 16K circuits from such firms as Texas Instruments, Inc. and Intel Corp. over the next year [CW, Oct. 29].

Principal Memory Chip

The 64K random-access memory (RAM) was announced as the principal memory chip for the 4300 when that line was introduced a year ago.

As is customary in the semiconductor industry, Davis would not comment about specific yields or output rates for the 64K RAM in production at his

plant using the silicon aluminum metal oxide semiconductor (Samos) process, but he said it was his observation that IBM's yields on the 64K part were at least as good as the semiconductor industrywide yield average on the 16K MOS RAM.

Davis said he could not comment on any possible impact of 64K RAM shortages on the impending H series of computers since IBM's policy precludes comment on unannounced products.

Software Costs Seen on the Rise

(Continued from Page 1)

out that the logic is so well established in offerings from a number of vendors that most user sites would be "ill-advised to code these programs themselves."

The vendors have learned they have to explain their products in terms the real end users can understand. Users have their own language, whereas DPers often surround the possibility of a solution with a "cocoon of software jargon."

DBMS Growth

Even though packages now span the gamut from statistical routines to optical lens design, Cobol programmers will not be out of work, he added reassuringly. On the other hand, DBMS with high-level query facilities have begun to show a very large growth for those applications that are not appropriate for packaged solutions.

Combining support from the DP technician with user-friendly facilities provides "amazing advantages — too many and too amazing to define in detail," according to McCracken. Instead of defining the advantages, he offered several anecdotes about the Nomad DBMS available on the National CSS, Inc. network.

In one case, a potential client was invited to pick any use he might foresee, so he started talking about his record collection. In less than 13 minutes, "including typing and data entry," the user had a data base established and several listings generated.

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Claims System Supplied Too Small Clinic Suing Software House for \$4.5 Million

By Tom Henkel

CW Staff

DURHAM, N.C. — Upset with a turnkey system it claims does not work, a medical clinic consisting of 17 doctors here is suing the developer, Cleveland-based Neoterics, Inc., for \$4.5 million.

Charging Neoterics with inducement by fraudulent or innocent misrepresentation, negligence, negligent misrepresentation and breach of contract, Durham Clinic, P.A. said the developer recommended the clinic buy a system that was too small for the application. In addition, the suit charged that the applications programs and documentation Neoterics promised to deliver either did not work or were never actually delivered.

Countering the clinic's charges, Neoterics claimed the firm acted in good faith in delivering an accounting, scheduling and billing package. Neoterics holds that the system it recommended — a Data General Corp. Eclipse 130 with 128K bytes of memory — was good enough for the original specifications of the agreement.

The software firm said the clinic piled other application programs onto the system in addition to the programs developed by Neoterics. This, Neoterics stated, overloaded the system and cut the response time.

In 1977, when it decided it needed a computerized accounting, billing and scheduling system, the clinic had its eye on an NCR Corp. 8200 processor. When it approached NCR, officials from that company told the clinic it would be happy to sell it an 8200.

Unfortunately, NCR did not have all the applications programs the clinic requested. As an alternative, NCR recommended the clinic contact Neoterics, which could custom-design a software package to go with the 8200.

The clinic contacted Neoterics and asked the firm to prepare a proposal. According to the suit, Neoterics submitted the proposal in September 1977, promising to develop the system for the NCR hardware.

Neoterics said it would develop a system that would handle patient registration, patient treatment, billing, financial and general reporting and schedule appointments, the suit claimed.

In October 1977, the clinic stated, Neoterics recommended the clinic buy a DG Eclipse instead of the NCR processor. Claiming to be an OEM for DG, Neoterics said it could sell a complete turnkey system to the clinic so the clinic would not have to buy the hardware from NCR and let Neoterics

develop the software.

The clinic agreed to the proposal and signed a contract to that effect in December 1977.

The system was delivered May 1, 1978. In October 1978, the clinic stated, Neoterics said the software was ready and recommended it drop a service bureau the clinic had been using since 1973 to meet its DP needs. The clinic followed the recommendation.

System 'Unusable'

When it tried to use the new system, however, it did not work, the clinic claimed. The billing segment sent out bills with zero balances and incorrect dates. Revenue-by-doctor and credits-

by-payment figures did not balance with accounts receivable. Computerized files were lost, and the response time was so slow the clinic said the system was "totally unusable."

After the clinic had used the system for a month, it was out of capacity, according to the suit. In addition, the clinic claimed that the documentation Neoterics promised was never delivered.

Lawyers for Neoterics said the company delivered everything it had promised. If something had not been delivered, the company would have given the clinic an explanation, Neoterics attorney Gregory Lichko said.

Neoterics stated it never advised the

clinic to drop the service bureau. In fact, it recommended the opposite, because the clinic's package was a newly developed one. Lichko said that because the package was new, the clinic agreed there might be some initial bugs in the programs.

For its trouble in dealing with the new products, Neoterics said it offered to give the clinic a royalty on future packages sold to other similar clinics.

Neoterics held that the DG system, which it recommended over the NCR system, is an equivalent machine and did not affect the response time on the total application.

A hearing date for the case has yet to be set.



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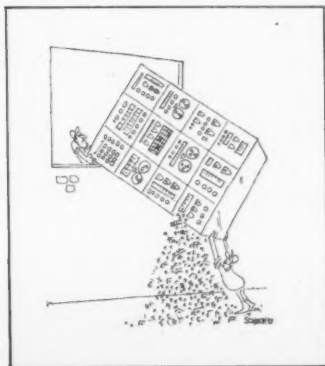
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CW 11/5/79



What Best Serves Public Interest? FCC Still Unsure on Separate Bell Subsidiaries

By Phil Hirsch

CW Washington Bureau
WASHINGTON, D.C. — The Federal Communications Commission (FCC) is still undecided about requiring AT&T to market its telephone network and "computer communications" service through separate corporate subsidiaries, according to FCC Commissioner Joseph R. Fogarty.

The DP industry and the Carter Administration both think full separation is a good idea; AT&T does not.

In a speech here last week to the fall meeting of the Computer and Business Equipment Manufacturers Association

(Cbema), Fogarty said the commission, in its Second Computer Inquiry, has not decided "even tentatively on the degree of separation that should be prescribed."

Critical Issue

As Fogarty put it, "The critical issue is the degree of vertical integration vs. arm's length separation which will best serve the public interest."

"We must assess the cost/benefit trade-offs inherent in varying degrees of separation, and we must determine whether economies which may flow to the user public from vertical integration outweigh potential abuses, and

whether other regulatory tools short of maximum separation — such as vigorous cost allocation and accounting requirements — would be sufficient to guard against cross-subsidization.

"Here there may be significant cost/economy benefits for the public in allowing the sharing of personnel, research and development, physical space and other corporate functions — benefits which we can ignore only in derogation of our public interest mandate."

Ideal Solution

An ideal solution, Fogarty added, would "preserve all possible benefits [of] an integrated corporate structure and

... permit the commission to monitor with certainty all the costs and revenues pertaining to each service of the carrier."

But since an ideal solution is not likely to be achievable, "we should strive to maximize the economies of vertical integration while [supporting] competitive practices."

The question of whether AT&T, as well as other telephone carriers, should be required to establish separate subsidiaries for computer-based communications services, and the extent of the separation needed, is the subject of a recently authorized FCC study.

Until this investigation is completed, "neither vertical integration nor maximum sep-

aration should be given a presumptive preference," Fogarty added.

Underlying the FCC's Second Computer Inquiry is the commission's desire to foster a regulatory environment "conducive to the stimulation of ... new and innovative communications-related offerings," Fogarty said.

The commission also wants to make it easier for users to exploit the benefits of such offerings, he added.

"These objectives can be fully met only by adopting a regulatory scheme which gives the carriers sufficient flexibility and competitive incentive to tailor their services to individual user needs," Fogarty explained.



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Mini-Based 'Weapon' Targets Human Error in Cancer Research

By Tim Scannell

CW Staff

BOSTON — Some research doctors here at University Hospital have developed a computer-based weapon to combat one of the field's greatest clinical enemies — human error.

Armed with a three-year, \$750,000 grant from the National Cancer Institute, the doctors designed a patient care and decision support system that is currently being used to track the chemotherapy histories of more than 250 ambulatory cancer victims.

Operating since June and built around a Digital Equipment Corp. PDP-11/34 mini-

computer, the system monitors every phase of each patient's progress. In addition, the system helps cut down on the high rate of error inherent in cancer research and other types of medical research, according to Robert M. Friedman, M.D., an assistant professor at Boston University's School of Medicine and director of the new system.

"What happens is that things just don't get done," Friedman said, noting that at some clinics the error rate in a manual recording system can be as high as 100%, effectively invalidating months of research work.

Basically a records management system, the decision support computer — described by Friedman as "the first of its kind" — can handle up to 10,000 patient records. It consists of a processor, two 88M-byte RP04 disk drives, a tape drive, a printer and several CRT terminals.

As in most records systems, doctors and clerical personnel at the hospital collect patient information, such as the person's name and social security number, on preprinted forms.

However, a great deal, if not all, of the patient medical data is recorded on individualized sheets generated by the computer for each patient. These forms not only list specific questions, prompting the doctors and nurses on the status of the case, but also display a number of charts and figures based on each patient's previous visit.

The output of the decision support machine is not limited to any set pattern or sequential order, as it would be in a manual system. Data can be portrayed in ways that suit particular departments of the

research clinic.

Data can also be repeated throughout a single report so that doctors do not have to flip back to review or compare figures. Information can be shown in time-oriented chunks that range from one day to several months.

But the most important feature of the system is its ability to keep researchers on the right clinical track and its potential to ward off, or at least diminish, human error.

While most paper-dependent research facilities shoot for accuracy, a great many patients are not asked the right questions, their answers are not recorded, crucial examinations are not performed or necessary laboratory tests are skipped, Friedman explained.

Not only can these unintentional mistakes nullify any test results, but they can also jeopardize the patient's health since therapy often involves the use of experimental and highly toxic drugs.

"If you're using benign agents and you make errors, the worst thing that could happen is that you can't include the patient data into your trial," he pointed out.

However, the research could very well involve agents that have "severe or even morbid consequences in their use."

The goal of most research and nonresearch projects is to see just how much of a certain drug a patient can stand without showing any toxic effects, Friedman continued.

"Once you've discerned either a toxic effect or the fact that the drug hasn't worked or has worked to a certain degree ... the practice is to modify the dose of the drugs or maybe the whole therapy."

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Music Pioneer of '60s Ready to Take on '80s

By Brad Schultz

CW Staff

SAN RAFAEL, Calif. — Not content with producing music for the ears alone, an electronic music pioneer of the 1960s plans to take on your entire body in the 1980s with some help from computer technology.

According to Phil Lesh, bass player for The Grateful Dead, computer-generated music can be felt — as vibrations through flesh and bone — as well as it can be heard.

In an interview here recently, Lesh said he views computer music as input to the neuroelectric system in the listener's body and considers himself a kind of bioengineer-cum-artist, inducing altered states of consciousness.

That last theme is a familiar one with members of The Dead, who with other bands from the San Francisco area have used psychedelic drugs to enhance musical composition and performance. For Lesh, experiments in the coming decade with what computers can do for music will be a natural follow-up to experiments in the past two decades with psychedelic music.

Pop Music of the Future

While most people regard computer music as an avant garde curiosity at present, digital technology will eventually revolutionize the recording industry, Lesh recently told *Computerworld*. "If only to stay competitive," professional musicians will apply computers as a means of simulating conventional musical instruments, producing sounds that cannot be made any other way, transforming sounds from the natural world into provocative melodies and inducing acoustic illusions.

Hence, to a large extent, computer music will literally be the popular music of the future, the 39-year-old guitarist predicted.

If computer-based music synthesizers ever sound exactly like 18th century woodwinds or a Stradivarius violin, they will not attain such precision for many years to come, Lesh said. Nevertheless, he noted, great strides have been made in developing such equipment since the first synthesizers appeared in the 1950s.

Synthesizers have been added to the instruments used by many well-known orchestras, bands and individual performers. They have also been a primary means of generating soundtracks for a number of motion pictures — including United Artists' recently released "Apocalypse Now," which features digital work by Lesh and his regular collaborators.

Moreover, the cost advantages of large-scale integration technology have put music synthesis capabilities in the personal computing arena. Microcomputer-driven synthesizers can now be purchased for less than the price of a late model car — a situation Lesh finds ominous.

Like a variation of the '50s hot rod stereotype, teenagers of the '80s may tinker with micro-driven synthesizer configurations in their garages, Lesh mused. And CRTs should be a "natural" creative medium for the next decade's adolescents, who will be continually exposed to TV, including Viewdata-type services, and other video devices.

Although Lesh enjoys playing with synthesizers, he is not content with merely conjuring up a simulated orchestra or two in The Dead's San Ra-

fael studio. Lesh gets his real kicks when, strapped into what may be the world's most complicated guitar apparatus, he takes his gear where it has never gone before, improvising sounds Johannes Brahms, his first music idol, could not have even imagined.

In recent years, some famous names of the electric rock spawned by San Francisco in the mid-1960s have worked with Lesh in various computer music projects. One project culminated in "Seastones," an album composed by Ned Lagin and released by San Rafael-based Round Records.

Lagin composed "Seastones" between 1971 and 1974 and performed it with Lesh, The Dead's Jerry Garcia and Mickey Hart, Jefferson Starship's Grace Slick and David Freiberg, David Crosby and Spencer Dryden from New Riders of the Purple Sage.

The "Seastones" crew employed a Perkin-Elmer Corp. 7/16 minicomputer with a "high-speed" arithmetic logic unit; something based on Intel Corp.'s 8080 microprocessor they called a "programmable bioelectronic I/O microprocessor"; and several types of music synthesizers.

Lesh demonstrated how computer music can have tactile as well as aural effects on the listener — sometimes causing weird illusions — by playing "Seastones" for CW at the home of The Grateful Dead's manager, Rock Scully. Some portions of the record elicited vibrations that shook the room, although the sound was not uncomfortably loud. One portion gave a Lesh



CW Photo by J. Beeler

Lesh explains how computer-generated music can be felt.

friend the impression that an armored military tank was rumbling up her driveway.

A current drawback to "Seastones" and similar experimental recordings of computer music is that few stereo phonograph systems can pick up all of what the studio has stamped into the record, Lesh pointed out.

But just wait a few years. Advances in hifi technology may allow your neighbor's kid to have The Grateful Dead come rumbling up your driveway as popular music goes digital.

Grateful Dead's Bass Player Finds DP Indispensable

By Brad Schultz

CW Staff

SAN RAFAEL, Calif. — There is nothing typical about how Phil Lesh got involved with computer systems.

The Grateful Dead's bass player never attended a computer science course nor wet-nursed a Cobol job. But the man who reportedly produced the first musical instrument with an internal electronic amplifier has found computer technology indispensable in advancing his art.

Lesh has been electrifying musical instruments since the late 1950s, but he credits the Beatles with establishing electronic music as a popular medium in the mid-1960s. For Lesh, computer music is a type of electronic music, which is in turn a type of electric music.

Electric music is simply what comes from electrically amplified instruments. Electronic music involves techniques for modifying pitch, intensity and other properties of sound with electric-powered devices, he explained. The latter — especially in conjunction with the use of psychedelic drugs — can be a powerful means of inciting the listener to view his world differently and become less inhibited.

For more than 20 years, Lesh has followed the contributions of orchestral composers in electronic music. As a

teenager, he studied with Luciano Berio, who later joined the Juilliard School of Music faculty, and was influenced by the partly improvisational works of Karlheinz Stockhausen, a German. Those composers, Lesh said, broke music into its most elementary particles and played with them.

Falling hardware prices allowed electronic musicians to purchase computers in the 1970s and digitize these particles, he continued.

With high-speed arithmetic logic units, composers have a ready means of simulating hypothetical combinations of instruments and performers.

Hence, composers can use computers to assemble simulated orchestras and try out prospective compositions.

Lesh hopes the miniaturization of processors will progress to the stage where he can plant a CPU in his guitar and feed it "commands" via sensors on the fret board. One reason this is not yet feasible is that no one has yet figured out where to place all the necessary wires within the instrument, he explained.

Lesh is eager to hear from any *Computerworld* readers with suggestions on how to address the various technical problems of applying computing to music. He can be reached c/o The Grateful Dead at P.O. Box 73, San Rafael, Calif. 94902.

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GAO Report Cites Poor DP Management

By Brad Schultz

Staff Writer

WASHINGTON, D.C. — Facing Congressional pressure to remedy alleged weaknesses in DP management, the Federal Communications Commission (FCC) has reactivated its Automatic Data Processing (ADP) Steering Committee under the chairmanship of the commission's chief scientist.

The Government Accounting Office (GAO), Congress' investigative arm, cited poor direction in DP and other FCC functions in a report published this summer.

Where DP is concerned, the

report recommended that the FCC increase top management involvement in computing and improve its planning process, responsiveness to internal users and methods for implementing and monitoring systems.

The FCC recently announced that chief scientist Stephen J. Lukasik will direct rehabilitation of its ADP program in response to the GAO probe, which was instigated at the request of Sen. Ernest F. Hollings (D-S.C.), chairman of the Senate's communications subcommittee.

Under Lukasik, the resurrec-

ted ADP Steering Committee will include officials of the commission's main user departments. They are the FCC executive director, the Private Radio Bureau chief, the Field Operations Bureau deputy chief and an assistant of FCC chairman Charles D. Ferris.

Letter to Hollings

In a letter to Hollings, Ferris promised that other FCC administrators will participate in the committee's deliberations "as appropriate," and the committee will be supported by the FCC's computing staff.

The committee will "review and approve" a number of systems development projects specified in the FCC's "Five-Year Plan for Information Processing" and will set priorities for those projects, Ferris continued.

Moreover, in compliance with a GAO recommendation, Ferris said he would require an annual zero-based budget review of ADP activities in order to facilitate planning. Zero-based budgeting entails

justifying each major expenditure before it is made.

In reaction to the GAO's call for greater top management involvement in DP matters, Ferris told Hollings that liaison officers will keep commissioners informed on user status at each FCC bureau and office.

The steering committee will regularly consult with internal units as it formulates decisions, Ferris pledged.

FCC Effectiveness

Concerned about proposed revisions of the 1934 Communications Act, Hollings asked the GAO in September 1978 to investigate the FCC's effectiveness as the federal regulator of telecommunications.

Ten months later, the GAO concluded "there is substantial merit in the commission form of organization for regulating . . . domestic and international communications."

Nevertheless, the GAO basically concluded that the FCC has been poorly run. Investigators cited:

- "Lack of planning and developing long-range goals and objectives.
- "Reluctance to formulate coherent regulatory policies as a guide to adjudication and

rule-making.

- "Neglect of program review and evaluation of regulatory effectiveness and impact.
- "Tendency toward procrastination and delay."

History of Program

The FCC's ADP program began in the late 1950s when the agency looked into using computer systems to reduce backlogs in the processing of applications and licenses.

From fiscal 1973 to fiscal 1979, the FCC's total ADP budget soared from \$1.8 million to \$5.7 million. Computing was allocated 8.1% of the agency's total budget in fiscal 1979 — several times the share computing takes at most government agencies.

Legal Obligation

The commission has a legal obligation to file responses with committees of both Congressional houses, the Office of Management and Budget and the GAO.

Although the FCC addresses data communications regularly, exerting great influence on DP vendors and users alike, the commission has yet to establish a formal bureau or office charged solely with that responsibility.

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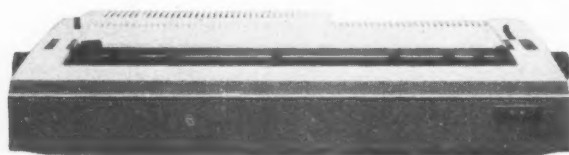
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Ladouceur Elected Efta Board Chairman

WASHINGTON, D.C. — The Electronic Funds Transfer Association (Efta) has elected Lawrence A. Ladouceur, senior vice-president at the Greenwich Savings Bank in New York City, as chairman of its Board of Governors.

Ladouceur succeeds Roland R. Eppley Jr., president of Eastern States Bankcard Association. Elected vice-chairman was Howard Mandelbaum, vice-president at Manufacturers Hanover Trust Co. in New York City.

Liam Carmody, vice-president of the First National State Bank of New Jersey, replaced Mandelbaum as chairman of the Public Affairs Committee of the association. He will also serve on Efta's Executive Committee.

Executive Committee

Also elected to the Executive Committee were: Robert Barone of Diebold, Inc., chairman of the Steering Committee; Roland R. Eppley Jr. of Eastern States Bankcard Association, immediate past chairman; Howard Johnson of Price Waterhouse and Co., treasurer of Efta; Jay B. Patton of Boeing Computer Services Co., chairman of the association's Technical Issues and Standards Committee; William Robinson Sr. of

Wilmington Savings Fund Society, chairman of the Membership Committee; and Samuel Shawhan of General Telephone and Electronics Corp.

Elected to three-year terms on the Board of Governors were: Howard Johnson of Price Waterhouse and Co., John McDonnell of Tymnet, Inc., Jay B. Patton of Boeing Computer Services Co., Patrick Portway of Satellite Business Systems, Stanley Spilecki representing the Savings Bank's Association of Connecticut and William C. Walker of General Electric Credit Corp.

Reelected as officers were: Henry v.Z. Hyde Jr. as President, Roger V. Barth Esq. as General Counsel and Howard Johnson as Treasurer. Elected to the newly created position of Vice-President of Public Affairs was Henry Palmer, who was formerly Assistant General Counsel of the National Commission of EFT. He is in the private practice of law with the Washington, D.C., firm of Cole, Raywid & Braverman.

Efta was founded in 1977 as a multiindustry, nonprofit trade association. It has sponsored numerous public forums focusing on problems affecting developers and implementers of EFT products.

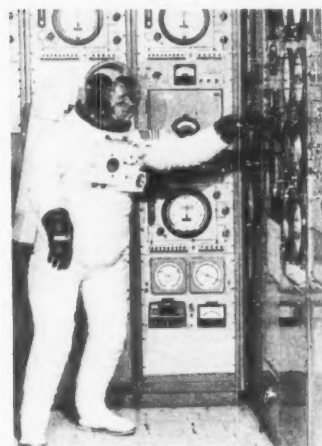
Nasa Goes to Off-the-Rack Concept Astronauts to Sport MPU-Controlled Suits

By Marguerite Zientara

CW Staff

WINDSOR LOCKS, Conn. — Computerized suits may not be your idea of high fashion, but they'll be the highest fashion around in the next decade when National Aeronautics and Space Administration (Nasa) shuttle astronauts blast into space wearing them.

Designed by the Hamilton Standard Division of United Technologies Corp., the space suit/life support systems will come in five sizes ranging from extra small to extra large and suitable for men and women, according to a Hamilton Standard spokesman.



Engineer demonstrates life support system in simulated space environment.

Although a near custom fit is as important today as it was when astronauts landed on the moon, Nasa has gone to the off-the-rack concept to save money, the spokesman said.

The suit, which will be donned each time a space traveler plans to work outside the shuttle orbiter during a flight, features a microprocessor-based display and control unit located on the chest. Looking down through his helmet, the astronaut will be able to read a small display screen providing start-up instructions and information on malfunctions in the suit and on exactly what to do to rectify the situation.

"If the astronaut is out in space and for some reason his suit develops a leak, or his helmet is damaged or is not on as tightly as it should be," the spokesman explained, "a warning tone will sound so the astronaut will look at the display, which will then print the information in English phrases." Not only will the display indicate what is going wrong, but it will indicate problems in order of importance if several should arise at once.



The life support backpack, which contains the microprocessor, also supplies seven hours' worth of oxygen for breathing, maintains suit pressure and cools and circulates the water used in the suit's undergarment.

It also controls oxygen temperature, removes carbon dioxide, odors and other contaminants from the suit's atmosphere and holds an extra half-hour's supply of oxygen for emergency use. A two-way radio is also located in the pack.

The two-piece suit is made of an airtight lining and covered by layers of puncture-resistant insulating fabrics. The gloves, made of a thin, tough polyester fabric, are said to provide for manual dexterity, allowing space crews to handle small tools easily "and even pick up articles as tiny and thin as a dime," the spokesman said.

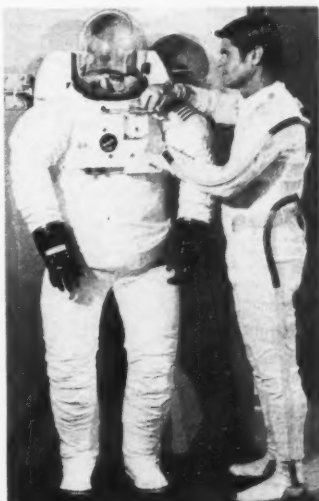
Thin plastic tubing is woven into the fabric of a separate undergarment that cools the body by circulating water throughout the tubing system. Hose-like tubes along the legs, arms and back also help cool the body by circulating oxygen. A bubble helmet, an extravehicular visor for eye protection, a drink bag, a waste removal system and a cap containing radio earphones and a microphone complete the space suit.

Little Preparation Required

The original Apollo moon mission suit and backpack were put on separately after more than one hour of preparation. In addition, the help of another astronaut was usually required to put on the suit. However, Hamilton Standard's latest style can be donned, connected and checked out by one person "in minutes," the firm said.

As prime contractor, Hamilton is the program's systems manager and is building the life support equipment and the hard section of the upper torso to which the backpack is attached. ILC Industries of Dover, Del., the major subcontractor, is fabricating the space suit itself. The two companies developed the space suits and backpacks worn by Apollo astronauts in the 1960s and early 1970s.

On board the orbiter, the crew will



Modeling space suit undergarment, engineer inspects malfunction warning device on outer garment.

travel in a shirtsleeve atmosphere made possible by environmental control equipment also built by Hamilton Standard. The equipment will condition and process the air in the crew's cabin and will remove harmful contaminants and carbon dioxide while maintaining comfortable temperatures

and humidity.

The shuttle, a reusable spacecraft that will be launched like a rocket, will haul like a truck and will land like an aircraft, will routinely deploy and repair satellites for communications, weather forecasting and scientific research.

Tornado Hits Aeronautical Facility

WINDSOR LOCKS, Conn. — If the idea of space travel seems a little risky to you, consider the possibility that a tornado could strike without warning, at any moment, right here on terra firma.

That's what happened here last month in an area of the country very rarely hit by such vagaries of weather. United Technologies Corp.'s Hamilton Standard Division here, including its aeronautical and industrial development facility, suffered severe damages.

In addition to damaging homes and businesses to the tune of more than \$180 million, the tornado left one person dead and more than 100 hospitalized, according to news reports.

Besides ripping the roof off Hamilton Standard's auto emission equipment testing facility, the tornado caused a power outage that shut down the entire complex for 32 hours and its com-

puter equipment for slightly more than 24 hours, according to a company spokesman.

The Hamilton division, which runs an IBM 370/168 and "several hundred" Computer Optics, Inc. terminals located throughout the complex, lost no data and sustained no hardware or software damage, thanks to an emergency backup motor generator system designed to prevent power surges, the spokesman said.

Technicians got the entire system back on-line in an hour and a half after power was restored, and the third shift reported for work an hour and a half after that.

While Hamilton Standard fell behind somewhat in its production schedule, "we expect to be fully caught up very soon," a spokesman said shortly after the event.

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In Senate Subcommittee Hearing FBI Criticized for DP Management

CW Washington Bureau
WASHINGTON, D.C. — Congress must quickly come to grips with "the revolutionary area of computers and their use in law enforcement," a Senate subcommittee considering a proposed charter for the Federal Bureau of Investigation (FBI) was told recently.

The charter legislation does not adequately address "the most controversial parts of the bureau's collection and dissemination system, the computerized National Crime Information Center (NCIC)," according to John J. Kennedy, a New York attorney.

Kennedy testified before the Senate Subcommittee on Criminal Justice on Oct. 25, as part of a one-day hearing on the NCIC and its controversial Computerized Criminal History (CCH) records system.

Although the proposed FBI charter does not specifically address the role the bureau should play in a nationwide CCH collection and distribution system, the NCIC is so critical to the increasing automation of state and local law enforcement agencies that the system may well deserve a separate charter of its own, Kennedy said.

Kennedy is director of the criminal justice project of the Scientists' Institute for Public Information, which has been studying the use of computer technology in law enforcement for several years. He is also a member of Congress's Office of Technology Assessment (OTA), an advisory panel on the NCIC.

The OTA is nearing completion of an in-depth study of NCIC, but Subcommittee Chairman Sen. Joseph Biden (D-Del.) is concerned the OTA report might be too late to influence Senate consideration of the FBI charter legislation.

Responding to that concern, Kennedy urged the subcommittee to proceed with development of "a national policy on computerized criminal justice information systems" and pre-

sented the subcommittee with several options Congress might consider when drawing up statutory guidelines for development of the NCIC.

Kennedy noted that the idea of an FBI in control of a centralized criminal history file and operating a message-switching facility for interstate exchange of criminal records "has raised the hackles of civil libertarians," who fear the NCIC might develop into a "feared national data bank."

Kennedy blamed much of the NCIC controversy on the FBI's blasé attitude toward new technology and blasted the bureau's NCIC management. The system is plagued with "a lack of professional computer management," he said. "FBI agents are used as computer managers when they simply don't have the expertise to run large computer systems."

But even with the system's present problems — and Kennedy said the system "is in deep trouble" because of obsolete equipment and poor management — "most people, both in and out of the criminal justice community, would agree that there is a need for the rapid interstate transmission of information on people wanted for serious crimes, for information about stolen cars and for information in other serious criminal matters."

Technology Not Key

Given that need, Kennedy said, Congress must decide how the NCIC should be configured and who should manage it. He warned the issue should not be clouded with technological arguments.

"Almost any system configuration is possible, ranging from a single large computer in Washington to a system of small computers scattered around the nation in state and local police departments." Essentially, all the options add up to a nationwide network, he pointed out, so "choosing the right technical configuration and the right

equipment are not the key issues.

"Computerization in and of itself is not the problem. You cannot and should not attempt to stop the use of computers for recordkeeping and information functions. It would be impossible to carry on such a neoluddite campaign anyway.

"We must learn to channel computer technology, maximize its benefits and learn to live with it," Kennedy stated.

"The federal government must begin now to plan its response to the proliferation of computers and the dissemination of criminal justice information, understanding that these issues aren't primarily technical ones," he noted. "Systems are only as good as they are regulated and managed, and no system will function well without oversight, auditing and management controls

"All the options present problems and have widespread political implications," he continued.

In addition, Kennedy offered several recommendations for "short-term" congressional action on the NCIC.

"A clear-cut legislative framework containing oversight, auditing and sanctions, as well as a plan, is needed for the NCIC . . . There must be a process for coherent planning no matter what system is eventually adopted. Advanced technology can't be allowed to develop helter-skelter."

A financing plan — ideally one that spreads the cost of the system among its users — should be developed.

"There should be a diminished role for the FBI in any future system. As a federal operating law enforcement agency, it would be highly desirable that it not have such exclusive power over the operation of a major computer system . . . [that] is capable of controlling the flow of criminal justice information."

"Whatever system is chosen should be managed by expert computer managers — probably civilians — and not by ordinary law enforcement personnel. They must be given modern equipment with flexible procurement rules, so that they don't wind up using museum-quality systems, as some law enforcement systems are using today."

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Data Flow Report Slated

ARLINGTON, Va. — A limited number of copies of a two-volume report on transborder data flow will be released for sale by the American Federation of Information Processing Societies, Inc. (Afips) this month.

Volume I describes the basic issues relating to transborder data flow and was prepared by the Afips panel on transborder data flow under the chairmanship of Prof. Rein Turn of California State University at Northridge and the Afips Washington, D.C. office.

Volume II contains officially authorized English translations of European data protection laws as well as a bibliography prepared by Eric J. Novotny, senior consultant at Computer Resource Controls, Inc.

In addition, the second volume reproduces several other background documents in the area, including the Council of Europe "Draft Convention" and a draft of the Organization for Economic Cooperation and Development's (OECD) guidelines.

The set is available for \$40, with Volume I priced separately at \$15 and Volume II available for \$25, from Afips

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Calendar

Dec. 1, New York — **Designing and Marketing Information Products and Services.** Contact: Nina T. Kurtis, School of Continuing Education, Pratt Institute, Brooklyn, N.Y. 11205.

Dec. 3, Washington, D.C. — **Senior Executive Overview.** Contact: Computer Power Management Corp., P.O. Box 1403, Rockville, Md. 20850. Also being held Dec. 10 in Fort Lauderdale, Fla.

Dec. 3, Boston — **Management Control of Distributed Processors.** Contact: Harvard University, Program on Information Resources Policy, 200

Aikien St., Cambridge, Mass. 02138.

Dec. 3-4, Los Angeles — **Minicomputers and Small Computers: Selection and Usage Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 3-4, New York — **Local Computer Networks.** Contact: Datacommunications, McGraw-Hill World Headquarters, 1221 Ave. of the Americas, New York, N.Y. 10020.

Dec. 3-4, Orlando, Fla. — **Managing Data as a Resource: Principles and Practices.** Con-

tact: Data Resource Management Associates, 19 Orchard Way N., Rockville, Md. 20854.

Dec. 3-5, Dallas — **Data Communications: An Introduction to Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held Dec. 10-12 in San Francisco.

Dec. 3-5, Washington, D.C. — **DP Project Management: A Practical Approach.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 3-5, Washington, D.C. — **Information Systems as a Management Tool for the Financial Executive,** sponsored by the Association of Government Accountants. Contact: Ken Burroughs, DBD Systems, Inc., 1500 N. Beauregard St., Alexandria, Va. 22311.

Dec. 3-5, New York — **Data Processing: An Introduction to Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 3-5, San Francisco — **DP Operations Today: Effective Scheduling and Console Operation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 3-5, New York — **Word Processing: Effective Operations Management.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 3-5, San Francisco — **Computer Crime — Automated Fraud.** Contact: Infotech International, Inc., Suite 328, 234 E. Colorado Blvd., Pasadena, Calif. 91101.

Dec. 3-5, San Diego — **1979 Winter Simulation Conference,** sponsored by the Society for Industrial and Applied Mathematics, Operations Research Society of America, Institute of Management Sciences, Society of Computer Simulation, Inc., Institute of Electrical and Electronics Engineers and the American Institute of Industrial Engineers. Contact: Mitchell Speigel, FedSim/NS, Department of the Air Force, Washington, D.C. 20330.

Dec. 3-5, Washington, D.C. — **Information Systems and Financial Management — Today's Essential Partnership.** Contact: Association of Government Accountants, 12611 Davan Drive, Silver Springs, Md. 20904.

Dec. 3-5, Palo Alto, Calif. — **Microcomputer Software Design.** Contact: Hellman Associates, 730 Alvarado Court, Stanford, Calif. 94305.

Dec. 3-7, New York — **Data Base Concepts and Design.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

The CW Calendar generally appears in the first and second issues of each month, and events are listed a month in advance.

All conference, show and seminar announcements should be sent to Calendar, CW Editorial Department, 797 Washington St., Newton, Mass. 02160, at least six weeks prior to the month in which the event is slated to occur.

Dec. 3-7, Dallas — **Achieving Effective Project Management.** Contact: Atlantic Software, Inc., 910 Lafayette Building, 5th and Chestnut Sts., Philadelphia, Pa. 19106.

Dec. 3-7, Washington, D.C. — **Computer Contract Negotiation.** Contact: Brandon Consulting Group, 1775 Broadway, New York, N.Y. 10019.

Dec. 3-7, Palo Alto, Calif. — **Pascal Programming Workshop.** Contact: Institute for Advanced Professional Studies, 1 Gateway Center, Newton, Mass. 02158.

Dec. 3-7, Washington, D.C. — **DP Productivity Improvement Workshop and Seminar.** Contact: Gary R. Stevens, Johnson Systems, Inc., 7923 Jones Branch Drive, McLean, Va. 22102.

Dec. 3-7, San Francisco — **Management Style: Self-Directed Growth.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020. Also being held Dec. 10-14 in Chicago.

Dec. 4-5, Washington, D.C. — **Management Seminar.** Contact: Computer Power Management Corp., P.O. Box 1403, Rockville, Md. 20850. Also being held Dec. 11-12 in Fort Lauderdale, Fla.

Dec. 4-6, Fort Lauderdale, Fla. — **Disaster Recovery Planning Seminar/Workshop.** Contact: Devlin Associates, Suite 795, 1150 First Ave., King of Prussia, Pa. 19406.

Dec. 4-6, Washington, D.C. — **DP for Non-DP Managers and Professionals.** Contact: Management Resources International, Inc., 6621 Electronic Drive, Springfield, Va. 22151.

Dec. 4-7, Washington, D.C. — **Software Quality Assurance.** Contact: Software Enterprises Corp., 2239 Townsgate Road, Westlake Village, Calif. 91361.

Dec. 5-7, Scottsdale, Ariz. — **Effect of Telecommunications on Word Processing.** Contact: Dataquest, Inc., 19055 Pruneridge Ave., Cupertino, Calif. 95014.

Dec. 5-7, Orlando, Fla. — **How to Build and Use a Data Resource Directory.** Contact: Data Resource Management Associates, 19 Orchard Way N., Rockville, Md. 20854.

Dec. 5-7, San Francisco — **Computer Performance Measurement: Tools and Techniques for Increased System Productivity.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 6-7, Los Angeles — **Data Communications: Advanced Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held Dec. 13-14 in Denver.

Dec. 6-7, Columbus, Ohio — **International Library Networking,** sponsored by the Council for Computerized Library Networks. Contact: Barbara Robinson, Director, Metropolitan Washington Library Council, Suite 200, 1875 Eye St. N.W., Washington, D.C. 20006.

Dec. 7-8, New York — **Computer Output Microfilm: An Introduction for Library Applications.** Contact: School for Continuing Education, Pratt Institute, Brooklyn, N.Y. 11205.

Dec. 8-9, Cherry Hill, N.J. — **Data Processing for Businesspeople Seminar.** Contact: Management Information Corp., 140 Barclay Center, Cherry Hill, N.J. 08034.

Dec. 10-11, Washington, D.C. — **Data Processing for Secretaries and Administrative Support Personnel.** Contact: Management Resources International, Inc., 6621 Electronic Drive, Springfield, Va. 22151.

Dec. 10-12, San Francisco — **Introduction to Teleprocessing Software.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 10-12, Los Angeles — **Distributed Systems: Are They Right for You?** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 10-12, Los Angeles — **Data Base Management Systems: A Comparative Analysis of General-Purpose Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 10-12, New York — **Cryptography and Data Security.** Contact: Hellman Associates, 730 Alvarado Court, Stanford, Calif. 94305.

Dec. 10-12, San Francisco — **Distributed Data Processing, Data Communications and Networks, Minicomputers.** Contact: American Institute of Industrial Engineers, Computer and Information Systems Division, P.O. Box 3727, Santa Monica, Calif. 90403.

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DP Crime Seen Hitting New Heights in 1980s

By Tom Henkel

CW Staff

NEW YORK — There's good news and bad news when you talk about computer security in the 1980s. The good news: computer security systems will be better than ever. The bad news: computer criminals will also be better than ever.

That's what computer crime expert Donn Parker told 150 financial managers at the Management Science America (MSA) "Management 1980" conference here.

Organized crime will make its DP debut in the next decade, according to Parker, a researcher at the Stanford Research Institute.

The mob will make use of career criminals, trained in DP by prison rehabilitation programs, along with top technicians recruited — sometimes unwillingly — from the ranks of "honest" DPs, to defraud computer systems, Parker said.

The incidence of large computer crimes will go down, but the size of the heists will go up. The national average of \$450,000 per computer crime will skyrocket.

Professional DP criminals will be much better at their craft than the hobbyist, who is now the major perpetrator of computer crime. However, there will still be opportunity for the devious hobbyist to steal small amounts from the systems of the '80s, because security will be directed toward protecting the big bucks, Parker said.

Financial institutions, which have been working for years to perfect security systems, will probably be safer than most DP users. In fact, Parker said, computer-controlled money will be safer than ever.

Many "friendly" information systems and interactive word processing systems provide little innate security. Moreover, they actually help the computer crook find what he wants by putting the information in an easy to read format, Parker said.

In the case of information management systems, minicomputers offer little protection. Security systems for smaller systems will be one of the greatest needs of the 1980s user, Parker noted.

Companies will also be faced

with the dilemma of deciding when a computer is secure enough. If a company goes too far, no one will be able to use the system, and production will fall off.

"The only safe computer is one that's not used," Parker said, adding that any security system can be breached — with the proper know-how.

A possible solution to secure, yet usable, computer systems is to make allowances for

small-time thefts and focus security on preventing big losses.

In theory, Parker said, with security systems getting more and more complex, the inexperienced crook will find it tough going to break into a computer. By coupling more frequent auditing with the more sophisticated security systems, small crimes could be held to a minimum.

With organized crime, inter-

national terrorist groups, possibly some unfriendly foreign governments and, of course, the run-of-the-mill crook all vying for the DP jackpot, computer crimes will become more inventive — and more devastating.

"Murder by computer" might also be the sign of the '80s. Process control, air traffic control, hospital intensive care unit monitoring systems and others could be used to do

in unsuspecting users, Parker said.

Because laws vary from state to state, a computer thief can avoid prosecution by committing his crime in a state without computer crime laws.

By using a portable computer terminal with an acoustic coupler, the computer crook can — in theory — hit any institution in the world, Parker said.

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"We need NCR's Direct Processing to keep everybody always current," says James W. Walker, M. D., president of PIMCO.

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When PIMCO was formed, in 1975, we began looking at computer hardware immediately. And we looked beyond the hardware. We also considered each manufacturer's history and reputation for integrity and the quality of service provided. When all the information was in, we selected the NCR 8200. I am happy to report that your users here in Florida—and everywhere else—rate NCR service as excellent.

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Did you anticipate moving up to the NCR 8430?

WALKER:

Not specifically. After all, ours is the first 8430 installed and wasn't available then. But as an agency sponsored by the Florida Medical Association to handle insurance for all the doctors in the state, we surely foresaw very rapid growth. And we were pleased by NCR's assurance we could move up to more powerful systems without obsoleting our software.

MIDDLETON:

That is NCR's Migration Path Engineering. You can move from one system to the next larger without paying a software penalty.



James W. Walker, M.D., (right) is president of Professional Insurance Management Company (PIMCO) of Jacksonville. Paul Middleton is his NCR account manager. The photo was taken in the formal garden behind the PIMCO offices on the edge of the St. John River.

WALKER:

I've been pleased, too, with the relationship which has developed between PIMCO and NCR. NCR has done everything you've promised us, and then some. And that's important, because I am making this system the central reference point in our business. I am resisting the tendency of the typical insurance office to depend on files in manila folders. We need NCR's Direct Processing to keep everybody always current.

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Managers on the Move

F.J. SMITH has been appointed director of data processing at Kirby Building Systems in Houston.

Smith was formerly in charge of computer systems operations for the Air Force.

He holds a B.S. degree in industrial engineering and management from



F.J. Smith

Oklahoma State University and an M.B.S. in information systems from California State University at Sacramento.

...

THOMAS E. VAN ZANDT has been named manager of data processing at Taylor Rental Corp. in Springfield, Mass.

Van Zandt will head operations and systems development for the company's computer functions, including internal information systems and computer inventory analysis and accounting programs.

Prior to joining Taylor Rental Corp., he was a senior account manager of large-scale commercial and industrial computer systems at NCR Corp. in Springfield.

Van Zandt is currently completing a degree in business administration at Western New England College.



Thomas E. Van Zandt

DONALD J. BROWN has been appointed director of information systems and communications at Perini Corp. in Framingham, Mass.

Before joining Perini Corp. in 1973 as manager of corporate data processing, Brown was employed with E.I. DuPont de Nemours Co. in Delaware and with PHI Computer Services of Arlington, Mass., as a systems analyst. He was also manager of commercial applications and new product development for Commercial Information

Corp. of Arlington.

Brown is a graduate of Clarkson College of Technology in Potsdam, N.Y.

...

JOHN SEMBLEWSKI has been named corporate director of Management Information Systems for Unishops, Inc. in Jersey City, N.J.

Semblewski will be responsible for overall corporate supervision of electronic data processing programs and systems installations. He has been employed with Unishops since 1972.

Semblewski holds a B.S. degree in business administration from Monmouth College. He also attended Ocean County College, where he majored in computer science.

...

JERRY A. GREENBLATT has been appointed director of management information systems at the Controls Division of The Singer Co. in Schiller Park, Ill.

Greenblatt formerly was associated with the G.D. Searle and Co. Diagnostic Products Group as director of man-



Jerry A. Greenblatt

agement information systems.

He is a graduate of Miami University in Ohio.

...

C.T. KROPAC has been named data processing manager at Doremus & Co. in New York.

Before joining Doremus, Kropac was director of data processing at Knickerbocker Toy Co., a division of Warner Communications. Prior to that, he held positions in the data processing area with Alpha Metals Inc., The Singer Co. and Sportswear Industries, Inc.

Kropac holds a B.S. degree in management from Fairleigh Dickinson University.

...

DAVID L. DAWSON has been appointed director of computer services at Matson Navigation Co. in San Francisco.

Dawson formerly was director of corporate management and computer systems for United States Lines, Inc., in New York. Before that he was with Berkey Photo, Inc. and prior to that served eight years with Sea-Land Service, Inc., where he was director of systems development.

Dawson earned an M.S. degree in management science at Steven's Institute of Technology and has completed advanced courses in New York University's M.B.A. program.

DR. CLOY J. WALTER has been appointed director and group vice-president of corporate management services in data processing for Levi Strauss & Co.

In his new position he will assist the office of the president in analyzing and projecting the company's DP management needs.

Walter was most recently manager of the computer and telecommunications division of E.I. DuPont de Nemours & Co. He has also been director of com-

puter sciences for Collins Radio Co. and assistant to the vice-president for management systems and business planning for the autometrics division of North American Rockwell.

Walter holds a Ph.D. degree in mathematics and M.S. degrees in chemistry, physics and mathematics from the University of Iowa.

Walter also holds a master's degree in business administration from the University of Michigan.

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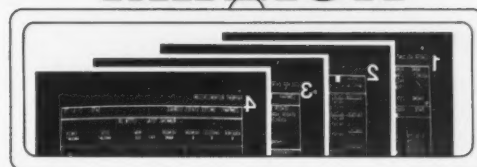
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Begun at Recent Seminar New York DPer's Working on Disaster Plans

By Connie Winkler

CW Staff

NEW YORK — What's a DP director to do if a tornado takes the roof off the data center or if firemen fighting a fire one floor up flood the tape library?

A tornado may never hit New York, but city DP department heads are setting about to design disaster contingency plans. The planning began at a recent seminar presented by the management consulting firm of Coopers & Lybrand and sponsored by the Computer Security Unit of the City Department of Investigation.

"We are convinced you really have no choice," Salvatore C. Catania, a Coopers & Lybrand partner, said. "If you are going to operate a data center, you have got to provide backup data processing power."

More and more of the city's business relies completely on DP operations. "Prolonged cessation of processing is not an alternative," Catania said. "We cannot agree to go out of business."

Catania called for a contingency plan which is "a complete, consistent definition of all the actions to be taken before, during and after a disaster, accompanied by a practical statement of

procedures which ensure that if followed on a continuing basis, all critical resources will be available in a contingency situation."

A contingency plan is not something that comes off a hardware or software vendor's shelf. "The contingency plan must deal with your time frame, budgets and your users' requirements," according to Martin E. Silverman, manager at Coopers & Lybrand. "A second one of everything [hardware] won't do it."

A contingency plan is not an informal agreement with a friend to provide processor resources between cooperating centers, and it is much more than storing files in an off-site library, Catania said.

A contingency plan doesn't have to

be extremely sophisticated or expensive to maintain or cause burdensome changes in the day-to-day data processing operation.

However, today's on-line systems do make contingency planning critical — and also more difficult, he added.

Developing a contingency plan is like developing a new system. "The steps are the same — analysis and identification of alternatives, detailed analysis, development of recommendations, development of the plan, testing implementation and follow-up," Silverman said. "The difference between a contingency plan and a system is that a contingency plan will not give you feedback on a day-to-day basis. You have to actively go out and test it."

And this will all be easier for the DP

staff than users. "Things only go smoothly when the user realizes you are talking about the day after Armageddon — the end of the world plus one."

Building the Plan

To begin building a contingency plan, data processing must determine the applications critical to the user organization. "We are talking about survival now," Catania said. "We pare back what we are doing — we can do a lot less and still have the [organization] survive."

One way to determine how critical applications are is to determine the penalty if the application is not running. Payroll or an application entitling the city to certain federal monies would be such programs. "Define the maximum critical 'out time' for each critical applications," Catania said.

Second, the critical resources to run these applications — including files, documentation, programs, I/O devices, special forms, personnel and processing power — must be detailed. All the applications and resource requirements then have to be documented and shared with users. Requirements might be stated in the form of "one-third of a 370/168 158 by the end of the first week," he said.

The next step is to ensure that resources are available when needed; procedures to make them available have to be provided. Just as in a disaster, specific responsibilities for the contingency plan also have to be assigned, Catania said.

All of the above needs to be written, then tested and maintained in conjunction with ongoing changes in the DP operation. Catania did not recommend pulling the CPU plug to test the backup plan, but said partial testing is necessary regularly.

But the most important final step is to place a final copy of the contingency plan in the vault with all the other necessities. Many forget that important last step, Silverman observed.

Contingency plans have to become a cost of doing business, something to be factored into the cost of an application, Catania said.

Consultant Offers Options For Disaster Planning

By a CW Staff Writer

NEW YORK — When a disaster hits a data center, many alternatives are open to the DP manager — some better than others.

At a recent seminar here, Coopers & Lybrand, a management consulting firm, listed prime ones:

- The Ostrich approach. Do nothing, thinking that "it won't happen to me. I can handle it if it does."

- "No data processing manager has the right to inflict this situation on his company," according to Martin E. Silverman, manager at Coopers & Lybrand.

- Clerical maintenance of vital records. This is fine as long as there are no time-critical reporting requirements, such as year-end filings. Disasters always happen the day before such filings, Silverman observed.

- Off-the-shelf approach. When something goes wrong, call the vendor for a new one. Off-the-shelf works only for that "time frame during which critical processing can be suspended without a dollar-and-cents or other penalty in excess of the cost of more sophisticated and/or time-efficient solutions," Silverman said.

- Warehouse approach. A second piece of identical equipment is stored in a separate warehouse in event of disaster. This has to be an extremely time critical application and use low-cost hardware, Silverman said. Such an approach might best cover one component or application in the contingency plan.

- Single/multiple company support agreement. One or several companies with compatible hardware and software agree in a legal contract to share processors. "These are fragile alternatives, and unless there is a legal agreement when you get to the door, you usually find there is no room at the inn," the consultant said.

- Company-controlled multiple sites. This only works for decentralized operations where there's at least a 20% redundancy between the operations and where the host could reduce his work load to 60%.

- Subscriber to third-party-provided service. This is a service bureau for disasters and it requires that the third

party's configurations evolve with the subscriber's. These services often evolve around industries, such as banking.

- Empty shell cooperative. Here basic electricity and telecommunications gear are kept in an empty building; when a contingency occurs, vendors bring in necessary hardware.

The problem is the time lag. One Coopers & Lybrand study indicated that, at an optimum, it would take IBM four days' to three weeks' lead time to simply ship equipment.

- Shared contingency facility. Companies cooperate on and proportionately fund a full operations facility that provides time-sharing and other services in non emergencies. In the U.S., the problem with this idea has been cost, although there are five successful shared facilities in Europe, Silverman said.

Ideally, this is for users with an IBM 370/148 or larger machine.

- Variations on the themes. "Nothing says that it all has to be in place at once or that you can't start small and grow," Silverman said. "Use success to gain additional funding."

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ALLENTOWN, Pa. — A large-scale system here is helping the Pennsylvania Power and Light Co. (PP&L) respond more quickly to customer complaints about service outages. The system, called Customer Interruption Analysis (CIA), lets the utility pinpoint the probable cause of distribution problems anywhere within its network.

The company services nearly one million customers in a 10,000-square mile area of eastern central Pennsylvania. It also generates power for the Pennsylvania-New Jersey-Maryland (PJM) interconnection. Accurate

recordkeeping is therefore crucial for the firm, its direct customers and the more than 21 million people who rely on the Interconnection for power.

"Our responsibilities include the analysis, design, programming and testing of complex systems, as well as the operation of a large computer center and an extensive [teleprocessing] network," Clair Noll, director of systems and computer services for PP&L, explained. The equipment in his computer center includes an 8M-byte IBM 3033, a 4M-byte IBM 370/165, a Model 3800 laser printer, Storage Technology Corp. tape drives, Memorex Corp. disk drives and an IBM

1287 document reader. The two systems operate under MVS.

The CIA system "just sort of grew over the years," Noll said. It is now a data base containing information on PP&L's 260,000 distribution transformers and 41,000 devices.

"We can relate every one of our customers to a transformer, and in turn, relate every transformer to another device within the system," according to Frank Long, manager of systems and programming. "We then relate each device further and further back into the electrical network. Finally, we get to where the distribution system begins — at the substation."

Reporting Outages

When individual customers call in to report power outages, the call is taken by an operator of one of the firm's more than 400 IBM 3278 CRTs. When a sufficient number of calls are received, the CIA software automatically associates the callers with their service transformers. This cuts down the time service personnel must spend looking for the source of the trouble.

When PP&L's service people have made repairs, the system automatically generates customer call-back lists to ensure that service has been restored. "Call-back reports can be prepared at any field office involved with the service restoration" through the com-

pany's teleprocessing network, Noll stated.

Another important part of the utility's DP operations is its service coordination system, designed to answer questions from future customers.

"Suppose we receive a call from someone building a house, or from a contractor who is completing a shopping center and wants service to begin at a certain location on a specific date," Bill Campbell, manager of business systems, said. "Satisfying the customer's needs requires close, efficient coordination among a number of different departments."

Providing service is not always a trivial, "plug-in" situation, because technicians at the utility may have to evaluate its requirements. They may, for example, have to determine the expense of the poles or conductors that bring power to the customer.

In addition, engineers have to determine whether the user's requirements will create an overload on existing transformers. Contractors might want estimates of the costs of putting power lines underground and running them overhead.

"Very often, the people we deal with are not even our customers. For example, we might be dealing with a contractor."

"So we maintain 'third-party' files," Campbell noted.

Caution Urged in Making Software Development Plan

NEW YORK — If you can set a realistic software development schedule and stick to it, you will probably get a favorable nod from the top brass and keep your staff from hating your guts.

That is Frank L. Van Husen's theory on software development — promise only what you can deliver. Speaking to a group of management-level executives at a conference here recently, Van Husen, group manager for SEI Computer Services, Inc. in Chicago, said too often the DP department promises too much too soon. This makes for an unhappy DP staff and upsets top managers, who seem to notice when the DP department misses a deadline more often than when it beats one.

"Nothing seems to frustrate those involved more than unrealistic deadlines they can't keep." The solution to the problem, Van Husen said, is to let top management decide the long-range goals and priorities. When the top brass tells the DP department what it needs most urgently, the DP manager can assign members of his staff to develop the software.

Reflecting Needs

Software design should reflect the business' requirements, not the needs of a few within the company. Top management should evaluate the long- and short-term benefits of software design options and identify the installable components of the improved software design, Van Husen said.

Both management and the DP department should recognize software maintenance and development are different functions. Maintenance, for ex-

ample, is not project-oriented; it creates a variable work load, and there is no clear start or end to it. Development, on the other hand, will be centered around a specific company need and will have a definite starting point and deadline, Van Husen said.

Development should not affect maintenance, and the reverse is also true, he said. In addition, companies must learn to use tools such as diagnostics and testing subsystems that will allow parallel development and maintenance.

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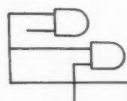
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The Changing Face

By Gary Slaughter
And Jack Stone

Ensuring that a DP training program delivers its promised return on the training investment is critical to the long-term success of the program.

Training that is cost-justified but does not meet effectiveness goals brings forth a host of problems. A pragmatic system of measurement and evaluation should be a key part of the design of every DP training program. The products of this effort should be fed back to DP management to assure the viability of the training function.

Although much has been written on the general subject of training measurement and evaluation, it is probably understood less by DP managers than any other aspect of training. Because of this situation, most DP managers either expect too much or too little from DP training. DP training directors

must educate DP managers to ask the right questions and to have realistic expectations for DP training measurement and evaluation activities.

In addition, DP management must be aware of how a measurement and evaluation program is established and what it will cost, particularly when the course focuses on skills development, subject matter knowledge or attitude change.

This article will briefly discuss four measures of training effectiveness: reaction, learning, behavior change and results. Obtaining evidence of training effectiveness in these categories is not as difficult or as expensive as obtaining final proof.

The article ends with a series of questions to help the reader perform a self-appraisal of his DP training program and, perhaps, help him determine the organization's readiness to undertake cost justification, measurement and evaluation studies of DP training.

A group of blue ribbon training directors met recently in Chicago to dis-

cuss how they could better prove the productivity results from the investment in DP training. Specifically, the group met to achieve these objectives:

This series of four articles was excerpted from The Data Processing Training Handbook by Gary Slaughter, to be published by Petrocelli Books, Inc., 1101 State Road, Princeton, N.J. 08540. The cloth-bound, 176-page book is available from the publisher for \$15. The excerpts were prepared and edited specifically for this series by Jack Stone.

- To determine if it were possible to demonstrate the impact of an internal DP training program on staff productivity (in terms of increased lines of correct code, fewer operator errors, re-

duced numbers of program bugs and so forth).

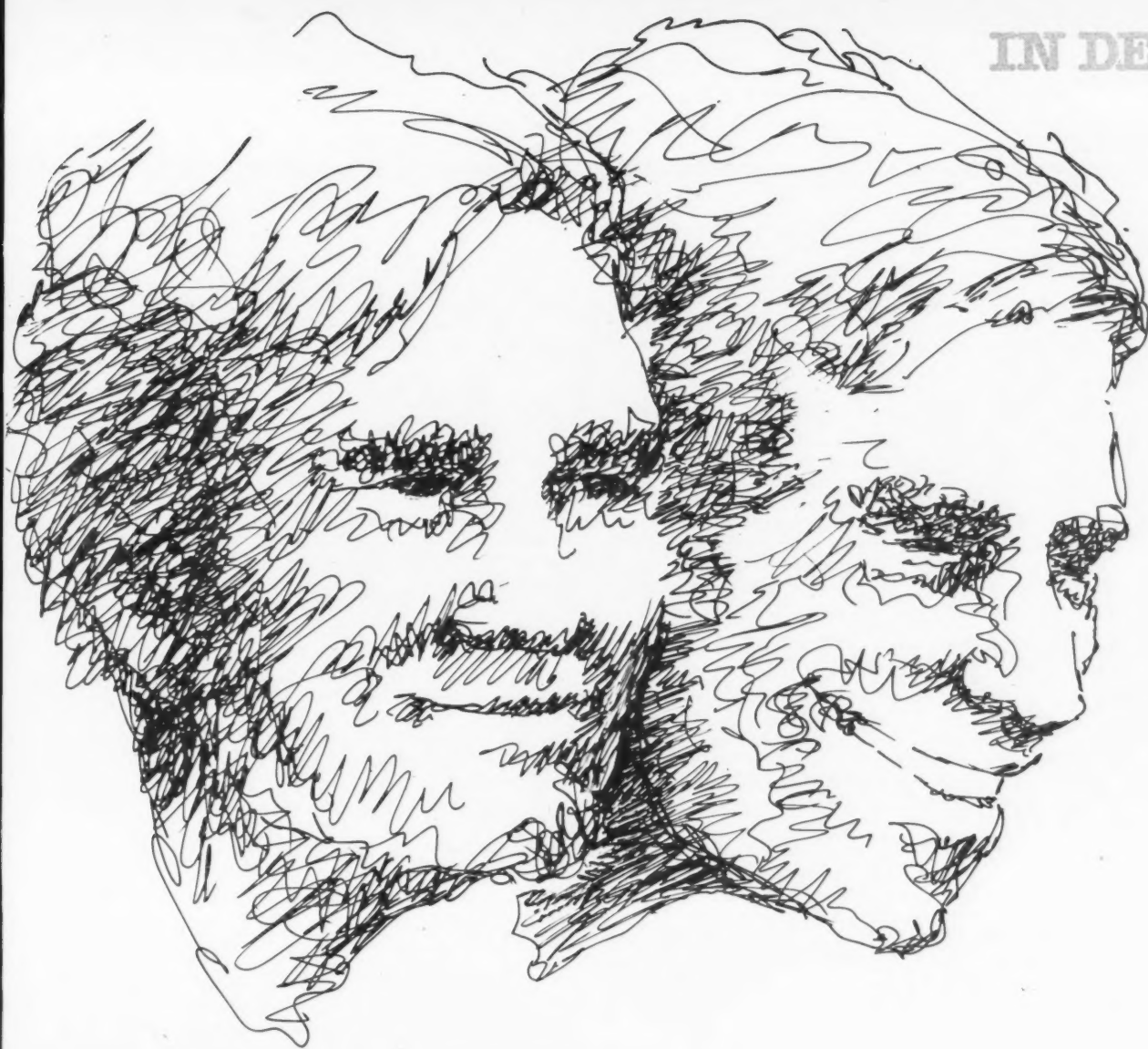
- To review their experiences in attempting to document this relationship.

- To establish a plan of action for a project to produce the documentation desired.

Unfortunately, the group felt that the state-of-the-art of productivity measurements was not sufficiently advanced to enable them to meet these objectives. But they did reach the conclusion that although DP trainers should continue to measure the effectiveness of training courses, they should be wary of trying to prove the relationship of these measurements to productivity gains.

In other words, DP training professionals should try to show the relationship between training and productivity, but they should realize the limitations to DP training and to the factual evidence that can be gathered to prove its results to management.

If management insists on final proof,



Of DP Training

Part 4: Measurement and Evaluation

often the best practical solution is to offer strong — but circumstantial — evidence that the training is delivering what was promised. A realistic way to gain acceptance of this evidence is to have management agree in advance to a measurement and evaluation mechanism for the DP training program. This strategy helps establish the cooperation and involvement of DP management from the beginning.

The fear that DP management will expect too much from training is offset by the reality that most DP managers expect too little from training in general and from measurement and evaluation programs in particular.

In most organizations, if DP managers ask questions at all about DP training, they try to evaluate performance by asking quantitative ones, like: "How many courses were conducted last year? For how many students? What was the cost per student?" These questions are useful in determining instructional activity but not instructional quality; for this purpose, it is

necessary to ask the right qualitative questions relating to the who, why, how and what of the behavior changes of the attendees.

It is a major challenge to the DP trainer in these organizations to educate DP managers to ask these questions so that management will properly understand and support the measurement and evaluation program.

Laying the Groundwork

Success of a training measurement and evaluation program is rarely assured without the involvement and support of everyone in the DP department, particularly the supervisors.

There are many ways to get this involvement, but perhaps the best is to form a committee or task force of DP managers to govern the training program. One DP organization in Florida was so sensitive to this need that it appointed a "school board" to oversee the DP training program. The board is composed of top DP management and the DP training director. Its task is to

evaluate the training and relate this evaluation to the department's personnel performance improvement program.

In preparing for measurement and evaluation, it is important to establish that training is the proper solution to a particular organization problem. Peter Drucker, the famous management consultant, once said, "The key to making the human resource more productive is not training — that comes second. The first requirement is to make sure that people can do the work they are being paid for. Then you train them."

For a number of management and organizational reasons, DPs may not be doing the work they are paid for. Common problems include poor supervision, improper job placement, poor working conditions, inadequate salary or fringe benefits and inappropriate management styles and philosophy. These problems must be resolved prior to implementing a training program because it is unlikely that train-

ing will have any long-term effect on personnel working under difficult conditions.

Evaluation Techniques

Don Kirkpatrick, professor of industrial psychology at the University of Wisconsin (Madison campus), is one of the most practical advocates of technical training measurement and evaluation in the country today. His approach has been translated into a set of practical tools for conducting DP training measurement and evaluation programs and educating DP management in the process.

The training measurement and evaluation activity should measure the effectiveness of DP training in four dimensions: reaction, learning, behavior and results.

• **Reaction.** The reaction of the students to a course is measured to find out how they feel about it immediately after its completion. For this purpose, student reaction, course evaluation or

(Continued on Page 26)

IN DEPTH

(Continued from Page 25)

student comment forms are used. One or more of these forms are in common use in most DP training organizations. The form, in addition to asking students for their overall reaction to the course, requests their opinions about course facilities, student meals, the instructor's teaching abilities, the instructor's knowledge of the subject and so on.

The reaction form can prove how students reacted to the course — pro-

vided, of course, the students are giving honest answers. Considerable care, therefore, must be applied in preparing and administering the forms. On this issue, there are arguments both pro and con regarding whether the students should sign the form.

Another consideration is this: If management does not intend to use the students' suggestions for improvements in the training, management should not include a request for suggestions in the form. The worst way to

reduce credibility is to leave a problem in a course uncorrected after soliciting student suggestions and then ignoring them.

Measuring student reaction to a course is important and should be a minimum measurement procedure. One should keep in mind, however, that students can react positively and still not learn very much. Even so, a good reaction to a program can help build an atmosphere conducive to learning. Certainly, a widespread neg-

ative reaction indicates a definite lack of learning effectiveness.

• **Learning.** In measuring the learning dimension of DP training, one should recall that students will learn new skills, knowledge or attitudes in a course. Most DP courses provide a mixture of these three kinds of learning, with one predominant.

For example, a structured design and programming workshop would emphasize the training of new skills in the structured approach to systems design and programming. As another example, an introductory data processing course would focus on basic knowledge of data processing. For a third, a course called "User's Guide to Systems Development" would concentrate on changing attitudes of users toward their roles and responsibilities in the systems process.

The predominant type of learning delivered by the training program will determine how that course is measured and evaluated and whether the results of the measurement can be considered proof or merely evidence that the desired learning has taken place.

One way to measure learning is to ask students what they learned from the course. Students can give their answers in writing or orally, but students are positively impressed when the DP training director interviews them personally after a course is completed.

Testing is another way to measure learning from a DP training course. Testing for skills and knowledge is always easier than testing for new attitudes. Tests should be administered both before and after the course to ascertain the differences in skills, knowledge or attitudes.

DP organizations must be cautious in their use of tests. For example, they are



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IN DEPTH

often designed into a DP training course to provide feedback for DP management, and students sometimes resent this. In addition, tests used in training programs which support recruitment, promotion or salary programs must be fully validated for job relevance, as government rules may restrict their use.

Another method of measuring student learning is classroom observation. This is particularly effective in workshop courses where students demonstrate their newly acquired skill or knowledge as a part of the learning process.

Measuring learning by student interviews, testing and classroom observation will provide evidence of learning, but not necessarily proof. As a minimum measurement and evaluation activity, every DP training organization should gather evidence of learning.

To obtain proof of learning, one must eliminate all the variables that affect the learning process, except the instruction itself. In brief, this may only be accomplished by pretesting and posttesting both an experimental group (which attends the course) and a control group (which does not). Proof of learning has been obtained if the results from testing show that the experimental group has, in fact, learned more than the control group.

Obtaining proof in this way is usually difficult and costly, but if DP managers insist on proof of learning, this approach is the only reliable way of getting it.

Behavior. Obtaining evidence of behavior change after the students have returned to the job is straightforward. One way is to ask the students in an appropriate way whether their behavior changed as a result of the course. Another is to ask the same questions of the supervisor.

Measurements of behavior change can be accomplished by before-and-after tests, questionnaires and interviews. After DP training, students who have reacted well to the course and who have apparently learned a lot, sometimes do not change their behavior when they resume their jobs. This is a common source of "black eyes" for the training function. These cases may often be explained by factors that

have nothing to do with the training.

Proof that the DP training course changed student behavior on the job is another complicated and costly measurement process, one that is seldom undertaken in DP departments, except by very large organizations with sizable DP training staffs. There are three steps to the process of finding this proof:

- Measure student behavior before the training course.
- Measure student behavior after the

course.

- Validate that the behavior change resulted from the course and not from some other factors.

Results. Some DP managers who are not knowledgeable about the limitations of DP training measurement and evaluation want proof that the training effort produces results in terms of increased DP department productivity.

However, measuring this dimension of DP training is extremely difficult, because the effect of the training is al-

most impossible to isolate from all the other variables that affect job performance.

If you have read the past three articles in this series, you should have a good idea of the concepts underlying the cost justification, measurement and evaluation of DP training. This knowledge puts you in a group of about 5% of the DP training directors and a group of 20% of general training directors.

(Continued on Page 29)

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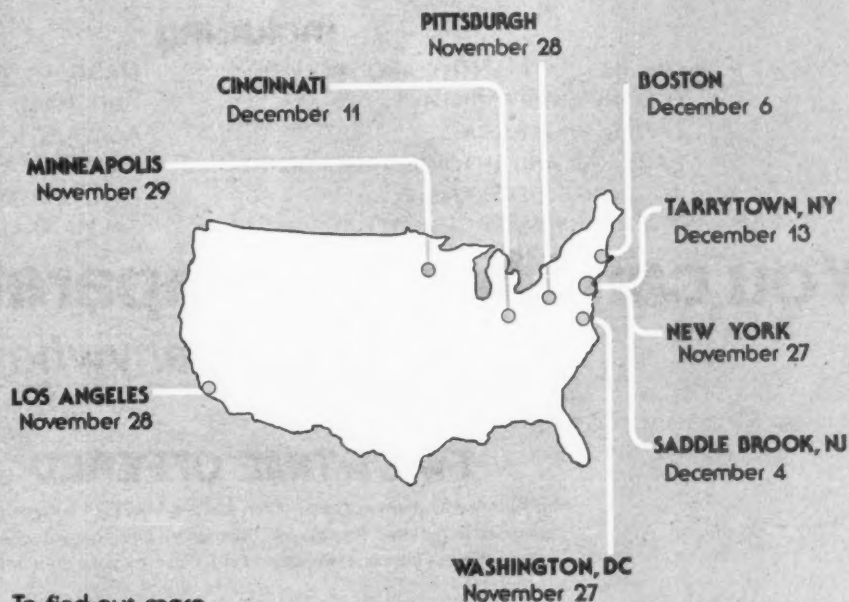
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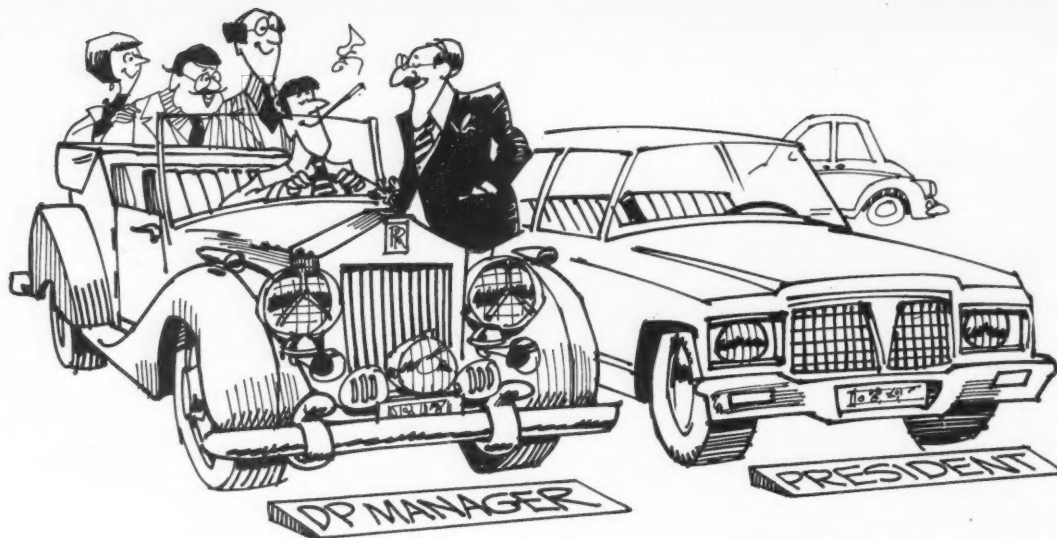
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DP Training IN DEPTH

(Continued from Page 27)

If you wish to know more about how your DP training function compares with that of others, perhaps with the purpose of introducing or improving your cost justification, measurement and evaluation methods, you are invited to take the following self-appraisal quiz. It is assumed that you are the director of the DP training function (or have an equivalent title or responsibility).

1. What percentage of the total DP budget is spent on training?

On the average, training budgets of DP organizations make up about 1.5% of the DP budget. If your budget is a smaller percentage, you ought to check to see why.

2. Do you have full-time people dedicated to the training function?

DP organizations, on the average, have one full-time trainer for every 100 DP people. This seems to be a bare minimum.

3. When do you submit your training budget?

If you submit your budget along with the DP department budget, you may not be budgeting properly. You may not know what the training requirements will be until the regular budget is approved. If the regular budget includes funding for new applications systems development or new hardware, the requirements for DP training may be increased significantly.

4. Do you report DP training activity or performance?

Preparing a report to DP management covering your activities for the quarter or year is a must, provided that the report answers DP management's qualitative as well as quantitative questions. If you are reporting only your activity — number of students, courses, hours and so forth — and not attempting to report performance, you may be encouraging your DP manager to ask the wrong questions about the DP training function.

5. Do you try to solve performance problems or just offer DP training?

If you look upon and recommend training as the solution to most every personnel performance problem in the DP organization, you may be doing your organization a disfavor.

Make it your job to challenge every

request for training to try to make certain that training is the right solution to the problem.

6. Does DP training in your organization involve three phases of activity — pretraining, training and posttraining?

DP training should involve several steps before training is implemented, including setting proper objectives, gaining agreement on measurement and evaluation criteria and pretesting and interviewing students.

Supervisors should tell their subordinates what is expected from them as the result of taking a training course. After the course, the students, supervisors and the DP training director should review the course together to make sure the expected job was done.

7. Have members of your training staff been trained to do their jobs effectively?

DP trainers tend to be the most undertrained of the professionals in the DP department.

Each trainer should be trained in at least three specialized areas for their proper professional growth: DP human resource development, administration of the DP training function and how to conduct a DP training course to train the trainer.

8. Do you cost-justify DP training?

If you don't, your DP training has a greater exposure to cutbacks during the next economic downturn.

9. Do you measure and evaluate the

(Continued on Page 30)

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IN DEPTH

(Continued from Page 29)
effectiveness of DP training?

If you don't, your DP training may have a credibility problem.

10. What is your reporting line-up?

If there is more than one person between you and the top DP manager, you may be in some degree of trouble. Ideally, you should report to the top person.

11. Do you know how much of your DP training budget is spent on each category of DP personnel? How does it

compare with what other DP organizations spend?

If you are spending substantially too little or too much in any one category, you should find out why.

12. Has your organization implemented a career development program in the DP department?

In the long run, the success of a DP training program is highest if it is an integral part of a career development program made up of these elements:

- A charter for DP training and de-

velopment.

- Task and skills analyses.
- Task performance standards.
- A promotion policy.
- A salary policy.
- A recruitment program.
- A training program including cost justification, measurement and evaluation.

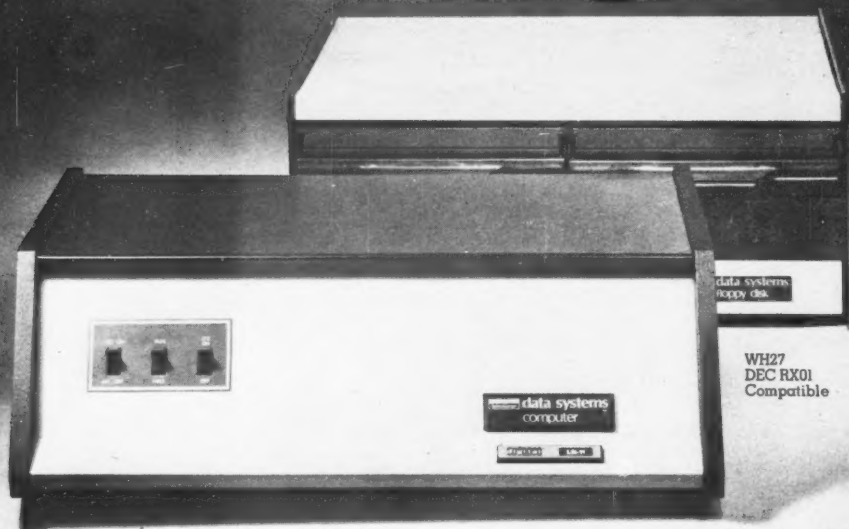
As the industry has moved forward during this decade, DP training in the larger organizations has become an accepted activity. However, relatively

few DP organizations use adequate methods to cost-justify, measure and evaluate these programs.

There are fewer firms with fully implemented career development programs in the DP department. Historically, DP organizations that have such programs started with DP training and gradually added the components of a career development program.

In the '80s, training will occupy a role of growing importance and will gain much broader acceptance as methods of cost justification, measurement and evaluation are put into place. Granting that some of these methods are qualitative and that absolute proof of training effectiveness is difficult to obtain, they certainly can help validate the worth of the training effort.

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CP-174



Gary Slaughter is president of Brandon Systems Institute, Inc., an independent DP training organization headquartered in Bethesda, Md.

During his tenure as president, Slaughter has introduced a number of innovations to the DP training industry, including shared training resources, a quarterly newsletter for DP training directors and the annual DP training survey.

Slaughter is a graduate of the University of Michigan School of Business Administration.



Jack L. Stone is a Washington, D.C.-based educator, consultant lecturer and author who specializes in human connections and training for the electronics industry.

His custom training programs for users of large-scale business systems are in use throughout business and government.

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The Better Way to Measure Your 3270 Response Time.

The Tempo system is the better way because it displays response time data for each transaction at the end-user's location and transmits that same information to the host for analysis by systems management.

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Response time is the period of time between an operator hitting the "enter key" and the notification of "system available" for further input of data. A simple definition. A complex problem, when the information which is available to the remote user and the host system are different, or when it is not available at either or both locations. This information gap can result in differences of opinion which obscure the real goal: improving system performance so that everyone benefits.

With the easily installed Tempo unit, information is displayed for the end-user and transmitted to the host system for collection, filing and analysis. The low-cost Tempo unit simply plugs into any 3277 in less than a minute. Response time then ceases to be a matter of opinion and becomes a subject of rational discussion.

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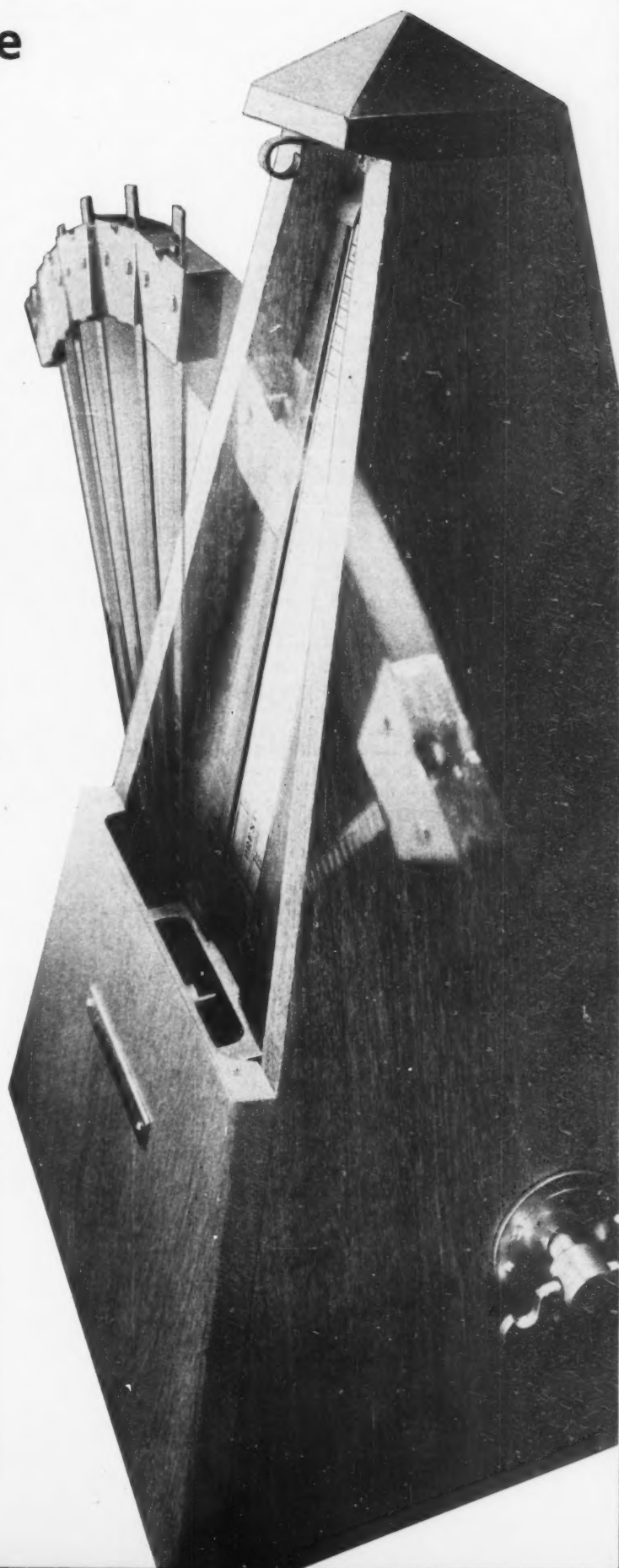
Host CPU _____ Number of 3277 Displays _____

Operating System _____ Other Displays _____

Number of 3271 Controllers _____ Number of Communications Lines _____

Return to DTSS Incorporated, 10 Allen Street, Hanover, NH 03755.

CW 1159



EDITORIAL

Obsolescence. . .

Paul Armer, executive secretary of the Charles Babbage Institute, has once again raised the question of professional obsolescence in the DP field [CW, Oct. 29].

This is one of Armer's favorite themes, but one that bears repeating.

Technology is advancing rapidly in the computer industry, and all managers need to keep abreast of changes if they wish to stay on top of their profession.

This does not necessarily mean, however, that all DPs have to understand the technology just for its own sake. Users, in particular, need to understand how to apply the new technologies to very specific business goals.

Too often, unfortunately, management sees DPs as interested only in the technology — and too often DPs are guilty of wanting the latest machine or system just to be up to date.

DPs have to develop somewhat of a split personality — they have to know the technology, but then they have to make hard business decisions about whether the technology fits their particular operations.

. . .And the Future

And while Armer warned DPs to keep up to date technologically, another speaker at the same conference emphasized the dual nature of the profession.

John Imlay, chairman of Management Science America, Inc., predicted that the number of chief executive officers with DP backgrounds will grow "astronomically" from the 10% level today.

In order to make the transition from DP management to top corporate management, DPs will obviously have to become more business-oriented than technology-oriented. They will have to study business as much as technical subjects.

Certainly, keeping up with technology on one hand and with management on the other will be no easy job. But for those who do, the rewards promise to be great.

DATA PAST

Five Years Ago Nov. 6, 1974

TORONTO — "A formal education in computer science is not an adequate — nor even an appropriate — background for those who must design and install large-scale computer systems in business environments," George Glaser, president of the American Federation of Information Processing Societies, Inc. (Afips) told the 10th annual meeting and conference of the Interuniversity Communications Council (Educom) here.

Characterizing formal education and competence in the business world as "the odd couple," Glaser charged universities with part of the responsibility for this problem.

WASHINGTON, D.C. — A General Accounting Office study revealed that state and local law enforcement officers were beginning to request computerized "rap sheets" before arrests were made rather than after.

QUEBEC CITY — The computer/communications strategy of IBM and

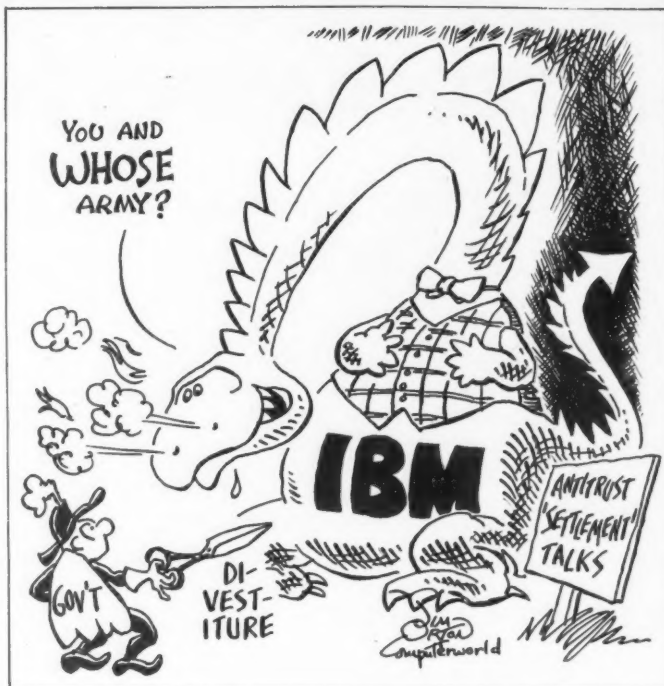
AT&T in the next few years will put users "in a cage." This was the opinion of A.G.W. Biddle, executive director of the Computer Industry Association, at the 16th annual Information Systems EDP Conference of the National Retail Merchants Association.

Eight Years Ago Nov. 3, 1971

PHILADELPHIA — Univac reconfigured its 9200-II and 9300-II CPUs into five packaged systems. Called the 9000 Series D, the disk-oriented family included the 9210, 9211, 9214, 9311 and 9314.

SAN FRANCISCO — The RCA Computer Users Association (CUA) announced it would attempt to stall the RCA contract certification process until RCA agreed to provide higher levels of support.

Delegates representing more than 25% of RCA's users declared they would recommend to their managements that they refuse to approve a settlement with RCA unless RCA agreed to the support requests made during CUA meetings.



LETTERS

'Usual Distortions'

Computerworld seems to be stuck in a groove. The twin editorials "The Latest Victim" and "Lessons of History" [Oct. 8, 15] contained the usual distortions and inaccuracies. They dragged out all the old chestnuts about how one company or another was driven from the industry, contrary to sworn testimony by high executives of some of the very firms you mention.

The editorials cite Intel Corp.'s difficulties and blamed IBM for introducing new and better products. That is hardly cause for castigation. The antitrust laws are supposed to promote competition and yield better products and lower costs to the consumer. They never were designed to protect individual competitors.

Perhaps it would be of interest to your readers to know that in all the private antitrust suits against IBM that have been decided on the merits, IBM has been found innocent of any violation, including the Transamerica Computer Co. case decided on Oct. 18. Perhaps federal judges and CW take different views of the law.

Victor J. Goldberg
Director of Communications

IBM
Armonk, N.Y.

Only Ourselves to Blame

"NBS Ponders Fortran, Basic as Federal Information Processing Standards" [CW, Sept. 3] pointed up dramatically a serious problem in the "federal" computer world.

Fortran has been in existence since 1957 and has been widely accepted and used, especially in scientific computing applications, ever since. Yet it has taken the National Bureau of Standards (NBS) more than 20 years to get around to proposing formal recognition of this language. Unthinkable!

And so I ask how in the (computer) world, can we make any progress in

the program language arena? Newer, better languages exist now (e.g., Pascal); and there is much hue and cry for yet better higher level (user-oriented) languages. Must the federal sector wait another 20 years before the improved languages are recognized?

No wonder software development and maintenance costs are going right through the ceiling in the federal sector. We have only ourselves (NBS) to blame.

Joan C. Bell
U.S. Department of Agriculture
Washington, D.C.

Thanks for Editorial

Thank you for the editorial "Low Blow to Women" [Sept. 24]. I — and I'm sure many others — appreciate your saying, and saying well, what so desperately needs to be said.

Much progress has been made in the 12 years since I entered this field, but I appreciate this proof that my belief that there's still room for improvement in the elimination of sexism is not a private paranoia (as some male colleagues claim).

Nancy White
Indianapolis, Ind.

What About 'Hopefully'?

The series of articles on better writing is timely and well-written. But the piece on dangling modifiers (Oct. 15) disappointed me severely by its failure to comment on a glaring example of this kind of solecism: the ubiquitous "hopefully."

Examples: Hopefully, my dress didn't shrink in the wash. Hopefully, the printer is fixed by now.

I could supply other examples, of course, but I'm sure it's unnecessary. Everyone can think of his own.

Fearfully, this has become a part of our language.

Miriam G. Vedder
Oneonta, N.Y.

HUMAN CONNECTION/Jack Stone

Where Are the Office Systems Planners?

In a splashy show of its line of "Integrated systems" for the office of the future, one vendor runs a sales movie that simulates information processing conditions in a mythical company before and after the installation of one of the systems. (The expression "integrated system" connotes a collection of every information-handling technology in the book, all of which are kludged together through communications devices and controlled from universal workstations in administrative offices.)

The problem addressed in the film is the development of a special report for top management. In the "before" era, some 30-odd people had to devote part or all of their time to generating information for the report. In the "after" time frame, however, only about a dozen people were involved because the computer-based office system handled many of the routine chores.

The vendor's sales movie, of course, was designed to impress procurement officials, but I felt it could easily antagonize end users and office managers or at least raise very serious doubts in their minds as to whether they can adjust their organization and personnel thinking to absorb the technology.

Were you to see the film, you would understand why.

As a fire-breathing DPer you would revel in the capabilities of the universal workstation. But typical office workers would be floored by what they would perceive to be unfathomable complexities.

This article is the second in a four-part series entitled "Office Automation: DP Opportunity or Burden?" This week, Stone addresses the subject of office systems planning.

Typical office managers would visualize their well-performing organization undergoing massive changes in job assignments, reporting structures and interrelationships to accommodate the electronic age in microcosm. These changes would threaten the status quo, if not managers' own jobs.

From what I have already seen, the trends in the merchandising of office systems — particularly of the large, complex systems, where all the big orders, plus follow-on upgrade business, are to be found — is a case of history repeating itself. More iron is unloaded,

more confusion reigns in the user groups and more "horror" stories of systems failures begin to circulate.

The following story is an indication of this trend. At the recent show, I happened to meet an acquaintance who had just joined the vendor in a sales capacity. I talked with him about the needs for in-depth installation planning of these systems and asked what his company was providing in the way of support. He gave me an off-the-record wink and said, "No problems! The customer just plugs 'em in and off he goes!"

From my experience, I believe his attitude is typical. Even if one grants that the hardware/software works, that most custom applications can be handled by parameter entries rather than by programming code and that the vendor maintenance personnel are on the ball, there is still a vast amount of effort to be applied in data conversion, in establishing new operating responsibilities and procedures and in training personnel — all of which were virtually ignored at the show.

"So what's new?" you might ask. "This situation with the first-time users has been around for nigh on a quarter of a century." The problem is

that nothing is new and that the first-time users have been given short shrift in the past. I fully expect things will get even worse for such users.

I'm not pinning the rose on the vendors alone. Part of the blame for the predicament falls squarely on the shoulders of top management, which continues to assign the responsibility for the procurement of complex office systems — computer-based or no — to loyal, long-term employees in the administrative area.

These employees try harder, but lack the background to make proper judgments about systems purchases or organizational and procedural changes.

The rest of the blame is assignable to the DP purists who want to avoid the installation quagmire associated with the office system environment.

Unless vendors show up with some decent systems engineering help, executives allocate qualified technical people to administrative departments or DPs decide to use some of their capable systems planners to attack the productivity problems of the administrative organization, we can look forward to these wonderful "integrated" office systems falling flat on their blue-accent panel faces.

READER COMMENTARY

Guy B. Chase Jr.

Cutting Upkeep Costs: Another Approach

In the commentary "Program Upkeep Costs Can Be Cut" [CW, Oct. 1], Larry Singer asserted that the costs of program maintenance can be lowered by keeping a maintenance log, inserting comments into the program source and maintaining standard test data. His case for the first and third methods was well made. But instead of the second method, our shop adopted another approach about three years ago which has had a dramatic effect upon the time spent coding and testing program changes.

Recognizing that the fundamental problem of maintenance is that of understanding the program's original logic, Singer suggested that as the programmer comes to understand that logic, he should add comments to guide future understanding. He was correct in seeing that costs are cut by investing present time against the future. But the basic premise of the "comments" method is that not only do programmers make minimum necessary program changes (as they learn through "bitter experience" to do), but also that they *should* make only those minimum changes.

We reject that premise. Comments can only provide a second opinion for already sick logic. Our rule of thumb, learned by sweet reward, is always to try to leave a program better than we find it. Most of us, as we gain experience, improve our coding technique — either by admiring someone else's logic/phrasing or by cursing it.

The trick to cutting maintenance costs is to improve the net quality of our software library. Each "original"

program establishes a stylistic precedent which will tend to be followed in future maintenance and from which less experienced programmers must learn their art. Badly written programs will stay badly written unless a conscious effort is made to correct them. By continually seeking to improve the code, one can achieve the maintenance cost objective by building upon past experience.

Best to Worst

Illegible or difficult-to-follow code is nearly always the result of some combination of circuitous logic, poor phrasing and bad choice of identifiers (data/procedure names). In the best cases, everything is clear, but a better or more efficient method could be used. When maintaining such code, one can easily localize the relevant portions and make changes without fear of causing unforeseen problems. In the worst cases (and I have personally seen a few), the code is so totally illegible that the entire program must be rewritten — a very expensive maneuver — because even the best people can't make sense of it.

Most programs, however, fall somewhere between the best and the worst. They can be deciphered, but with varying degrees of difficulty.

The maintenance task requires that the programmer thoroughly understand at least one of the logic paths (the one[s] to be modified) and understand all of the others well enough to know that they aren't related to the proposed changes. This period of

(Continued on Page 40)

READER COMMENTARY/ Michael Dickenson

Structured Techniques Ease Fortran Readability

I read with interest Walter B. Novinger's article about Flec's, the structured Fortran preprocessor [CW, Sept. 17]. While being a definite proponent of structured languages, I feel we should remember that the vast majority of scientific programs are still written in old-fashioned Fortran.

More attention should be paid to what techniques are available to make the vanilla Fortran IV program at least more readable, if not formally structured.

As a customer support manager at University Computing Co. Services Division in Chicago, I see an awful lot of engineer-written Fortran code. All the action happens between columns 7 and 20; comments are few and far between; the jumping around would make a flow chart look like spaghetti; IF statements are usually the arithmetic variety for maximum confusion (did everyone learn on IBM 1130s?); variable names are single-character for minimum "meaningfulness"; and God forbid a blank line should ever appear.

In the engineering environment, programming is much less formal than in the high-production DP operation. It is my experience that debugging and modification are the most time-consuming period of a program's life; furthermore, these functions are often performed by a different engineer/programmer and without benefit of trained assistance or software aids which you find in the "commercial" operation.

So, increased readability is the goal. What tools are available in Fortran IV

to achieve it?

1. ANSI Fortran IV ignores blanks beyond column 6 (except in literals), so there is no reason a program cannot be indented and spaced out across the page.

2. I tend to write programs in paragraphs, preceded by a negative IF statement.

Example:

```
IF (TYPE NE. 'A') GOTO 10
!in-line procedure to process data-type
'A'
....
```

```
GO TO EXIT
```

```
10 IF (TYPE NE. 'B') GOTO 20
```

Notice the indentation and blank lines included to separate and highlight the procedure. In this manner, all references to TYPE = 'A' are in one "paragraph" of the program and statement labels are minimized.

Note also the use of the literal in the IF statement (more readable). Sometimes an alpha statement label with an ASSIGNED GOTO may be better than a numeric label.

3. Implicit integer is a very useful technique, allowing more meaningful variable names. ALL REAL's should be explicitly declared — too often REAL variables are used for what should be integers, leading to this:

```
IF (X. EQ. 0.0) GOTO 10
```

which, if X is the result of numerous calculations, may not have the accuracy to make a correct test. Often, X should be an integer variable.

(Continued on Page 40)

Users Should Avoid All Cobol GOTOs. . .

Lim's Code

```

REFORMAT-THE-TRANS SECTION.
  OPEN INPUT TRANS-FILE.
  PERFORM READ-TRANS.
  PERFORM REFORMAT-PROCESS UNTIL TRANS-KEY EQUAL
HIGH-VALUES.
  CLOSE TRANS-FILE.
  GO TO REFORMAT-EXIT.

REFORMAT-PROCESS.
  MOVE TRANS-KEY TO SORT-KEY.
  MOVE TRANS-DATA TO SORT-DATA.
  RELEASE SORT-RECORD.
  PERFORM READ-TRANS.

READ-TRANS.
  READ TRANS-FILE INTO TRANS-WK-RECORD;
  AT END, MOVE HIGH-VALUES TO TRANS-KEY.

REFORMAT-EXIT. EXIT.

```

Figure 3

Sherman's Code

```

REFORMAT-THE-TRANS.
  OPEN INPUT TRANSFILE.
  PERFORM REFORMAT-PROCESS
  UNTIL TRANS-KEY EQUAL HIGH-VALUES.
  CLOSE TRANSFILE.
  REFORMAT-PROCESS.
  PERFORM READ-TRANS.
  IF TRANS-KEY NOT EQUAL HIGH-VALUES
  THEN MOVE TRANS-KEY TO SORT-KEY
  MOVE TRANS-DATA TO SORT-DATA
  RELEASE SORT-RECORD.
  READ-TRANS.
  READ TRANS-FILE INTO TRANS-WK-RECORD;
  AT END, MOVE HIGH-VALUES TO TRANS-KEY.

```

Figure 3

```

READ-TRANS.
  READ TRANS-FILE INTO TRANS-WK-RECORD;
  AT END, MOVE HIGH-VALUES TO TRANS-KEY.
  IF TRANS-KEY NOT EQUAL TO HIGH-VALUES
  THEN IF NOT SALES-RECORD
  THEN GO TO READ-TRANS.

```

Figure 4

```

READ-TRANS.
  PERFORM READ-TRANS-2
  UNTIL TRANS-KEY EQUAL HIGH-VALUES
  OR SALES-RECORD.
  READ-TRANS-2.
  READ TRANS-FILE INTO TRANS-WK-RECORD;
  AT END, MOVE HIGH-VALUES TO TRANS-KEY.

```

Figure 4

```

.....
PERFORM PROCESS-MASTER THRU PROCESS-MASTER-EXIT
  UNTIL MASTER-DEPT EQUAL TO HIGH-VALUES.
.....
PROCESS-MASTER.
  MOVE MASTER-DEPT TO OLD-DEPT.
  PERFORM SEARCH-FOR-DIV-NO.
  IF DIV-NO IS GREATER THAN DIV-MAX
  THEN PERFORM READ-MASTER
  UNTIL MASTER-DEPT NOT EQUAL TO OLD-DEPT
  GO TO PROCESS-MASTER-EXIT.
.....
(process the master)
.....
PROCESS-MASTER-EXIT. EXIT.
READ-MASTER.
  READ MASTER-FILE INTO MASTER-WK-RECORD;
  AT END, MOVE HIGH-VALUES TO MASTER-DEPT.

```

Figure 5

```

.....
PERFORM PROCESS-MASTER
  UNTIL MASTER-DEPT EQUAL HIGH-VALUES.
.....
PROCESS-MASTER.
  PERFORM READ-MASTER.
  IF MASTER-DEPT NOT EQUAL HIGH-VALUES
  THEN PERFORM PROCESS-MASTER-2.
PROCESS-MASTER-2
  IF MASTER-DEPT NOT EQUAL OLD-DEPT
  THEN PERFORM SEARCH-FOR-DIV-NO
  MOVE MASTER-DEPT TO OLD-DEPT.
  IF DIV-NO NOT GREATER DIV-MAX.
  THEN PROCESS THE MASTER.
READ-MASTER.
  READ MASTER-FILE INTO MASTER-WK-RECORD;
  AT END, MOVE HIGH-VALUES TO MASTER-DEPT.

```

Figure 5

```

VALIDATE-DATA.
  MOVE ZEROES TO ERROR-CNT.
  MOVE SPACES TO ALL ERROR MESSAGE POSITIONS.
  IF FIRST FIELD IS IN ERROR
  THEN ADD 1 TO ERROR-CNT
  MOVE FIELD ERROR MESSAGE
  TO MESSAGE POSITION (ERROR-CNT)
  IF ERROR-CNT EQUAL TO ERROR-MAX
  THEN GO TO VALIDATE-DATA-EXIT.
  IF SECOND FIELD IS IN ERROR
  THEN ADD 1 TO ERROR-CNT
  MOVE FIELD ERROR MESSAGE
  TO MESSAGE POSITION (ERROR-CNT)
  IF ERROR-CNT EQUAL TO ERROR-MAX
  THEN GO TO VALIDATE-DATA-EXIT.
.....
IF TWENTIETH FIELD IS IN ERROR
  THEN ADD 1 TO ERROR-CNT
  MOVE FIELD ERROR MESSAGE
  TO MESSAGE POSITION (ERROR-CNT).
VALIDATE-DATA-EXIT. EXIT.

```

Figure 6

```

VALIDATE-DATA.
  MOVE ZEROS TO ERROR-CNT.
  MOVE SPACES TO ALL ERROR MESSAGE POSITIONS.
  PERFORM VALIDATE-DATA-2
  VARYING ERR-INDEX FROM 1 BY 1
  UNTIL ERR-INDEX GREATER ERR-INDEX-LIMIT
  OR ERROR-CNT NOT LESS ERROR-CNT-LIMIT.
VALIDATE-DATA-2.
  IF FIELD (ERR-INDEX) IS IN ERROR
  THEN ADD 1 TO ERROR-CNT
  MOVE FIELD-ERROR-MESSAGE (ERR-INDEX)
  TO MESSAGE-POSITION (ERROR-CNT).

```

Figure 6

. . . In Most Cases They Make for Worst Code

READER COMMENTARY/Bruce Sherman

Pacifico A. Lim's "Users Shouldn't Avoid All Cobol GOTOs" [CW, Oct. 1] explained how the Cobol programmer can write easy-to-read programs using GOTO.

The author's experience in the field, he said, has been that GOTOless programming in Cobol is unrealistic and rather romantic. He advocated the use of GOTOs with discretion and suggested, as a rule, that GOTOs be avoided if their use will compromise the program's readability.

This rule is excellent, but for some reason, Lim violated it in every case, he coded. He used GOTOs when they really were not effective. GOTOs, in his cases, did not make good code — they made mediocre code. The rule Lim proposed can be restated more clearly as: "Avoid GOTOs because their use will compromise the readability of the program."

To support this rule, I have coded Lim's cases without using a single GOTO. The GOTOless code is easier to

read and understand.

In Figure 3, note that the GOTO version has two "PERFORM READ-TRANS" statements, whereas the GOTOless version has only one. Also, in the GOTO version, the REFORMAT-PROCESS paragraph releases a SORT-RECORD (output) and then reads a TRANS-FILE (input). Logically, the order should be reversed, as in the GOTOless version.

The GOTO version requires a GOTO statement and an EXIT statement. The GOTOless version does not. The GOTOless version has fewer statements and fewer paragraphs.

In Figure 4, the GOTO version embeds in one paragraph both the I/O and the processing. These should be separated, as they are in the GOTOless version, for structured code. The resulting code is easier to modify during subsequent maintenance.

In Figure 5, the GOTO version has the I/O in PROCESS-MASTER following the processing. Logically, the

processing should follow the I/O. This is the case in the GOTOless version. In the GOTOless version, three paragraph names are used, although only two paragraph names are required. READ-MASTER, the third paragraph, is invoked by PROCESS-MASTER to structure the I/O paragraphs apart from the processing paragraphs. The GOTO version uses only one GOTO, yet it is much more difficult to understand than the GOTOless version.

In Figure 6, the GOTO version is surprisingly cumbersome. It would require more than 120 statements to generate error messages for only 20 fields. The GOTOless version, in contrast, uses fewer than 10 statements to handle 20, 200 or 2,000 fields. The GOTOless version minimizes the voluminous coding by using indexing of tables. The tables contain the error messages and the error message positions. The GOTOless version takes advantage of the construct "PERFORM ... VARYING ... UNTIL." It is not only easier to read, but takes much less time to read as well.

In Figure 7, the GOTO version has no significant advantage over the GOTOless version. In fact, it has a serious limitation. The value for TRANS-CODE is expected to be an integer with a base of 1 and an increment of 1. In the GOTOless version, TRANS-CODE, or any other Cobol data name, can contain a wide variety of values. The GOTOless version is more versatile.

While writing this brief article, I made two interesting observations. First, the GOTO versions tend to be illogical because the processing routines sometimes precede the I/O routines. Also, output routines sometimes precede input routines. Second, the GOTO versions' testing and handling of the end-of-file condition is not always readily apparent.

The GOTOs do compromise the readability of the program. Avoid them.

Sherman is a programmer/analyst at the University of Detroit. He also does programming for computer installations using Cobol.

```
000500 PROCESS-TRANSACTIONS.
000510 GO TO PROCESS-TC1 PROCESS-TC 2 PROCESS-TC3
      DEPENDING ON TRANS-CODE.
000530 GO TO PROCESS-TC-ERROR.
000540 PROCESS-TC1.
000550 .....
000560 .....
000570 GO TO PROCESS-TRANS-EXIT.
000580 PROCESS-TC2.
000590 .....
000600 .....
000610 GO TO PROCESS-TRANS-EXIT.
000620 PROCESS-TC3.
000630 .....
000640 .....
000650 GO TO PROCESS-TRANS-EXIT.
000660 PROCESS-TC-ERROR.
000670 .....
000680 .....
000690 PROCESS-TRANS-EXIT. EXIT.
```

Figure 7

```
PROCESS-TRANSACTIONS.
IF TRANS-CODE EQUAL 1
  THEN PERFORM PROCESS-TC1
ELSE IF TRANS-CODE EQUAL 2
  THEN PERFORM PROCESS-TC2
ELSE IF TRANS-CODE EQUAL 3
  THEN PERFORM PROCESS-TC3
ELSE PERFORM PROCESS-TC-ERROR.
PROCESS-TC1.
.....
PROCESS-TC2.
.....
PROCESS-TC3.
.....
PROCESS-TC-ERROR.
.....
```

Figure 7 (Sherman)

THE TAYLOR REPORT/Alan Taylor

Generated Cobol: How Much Structure Needed?

A recent Taylor Report showed some of the output of a Cobol generator and predicted the importance of generated Cobol code in the 1980s [CW, Sept. 24]. Later, a reader attacked this prediction on the grounds that the Cobol coding style was not up-to-date [CW, Oct. 15].

The reader, John Siegel, felt that commending any code that had no semblance of structure was a disservice to Dijkstra, Yourdon and others who led the "structured revolution" of the 1970s. "Good old-fashioned management and discipline" is insufficient to ensure that programmers will produce good code, according to Siegel. Therefore, structured code is needed.

Well, I certainly would not want it to be thought that I have done a disservice to the leaders of structured programming. But I don't think that making structure a prerequisite before even considering the virtues of non-structured systems is doing them a service. Siegel did not claim that the Cobol shown was inaccurate, inefficient or anything like that — merely that it wasn't structured.

In fact, I do rather value structured

Cobol, and I highlighted its performance in another Cobol generator in a follow-up article [CW, Oct. 22], which was on its way to press before I knew of Siegel's criticism. But valuing structure does not make me retract the statement that generated Cobol capabilities are coming in the 1980s — which is what the original article was about.

Generated vs. Nongenerated

The coming discussion between generated and nongenerated Cobols will deal with the advantages and disadvantages of each style of Cobol program production. Like Siegel, I believe that how that code is produced is important, and the purpose of the example I gave was to show automatically generated code.

Cosmetically, it was not elegant — but before this can be built into an attack, the method of how it is produced and how it can be used by Cobol installation is important. Much of this is not seen on the surface of the code, and it is as well to look at generated code capabilities in general before drawing conclusions.

One of the important points of any program is how it can be maintained. In nongenerated Cobol, there is within the system only one way to maintain the code — by doing so at Cobol source-code level.

When working at source-code level, the added discipline of structure provides some considerable advantages. But the advantage that I noted in the generated source — that of a uniformity of source-code style, covering the unusual as well as the usual cases — may well have equal or greater advantages.

The point is that the generated code is forecastable without it being seen by the maintainer — in the same way that a doctor can often diagnose problems with the human body without ever seeing the individual concerned. The maintainer of a generated Cobol program who knows how the particular generator works will have many advantages, and may be able to go to the seat of the problem as quickly, or even quicker, than a maintainer who only knows that structured philosophy is supposed to have been used throughout the writing of the program.

Whether the advantages of generated code are greater than those of handwritten programs using structured Cobol is certainly open to question — and such a challenge would be both valid and welcome. But, by itself, it would not be enough.

Program Description

Maintenance in a generated Cobol system is not restricted to the Cobol source level. There is another level before this — a program description level.

Cobol generators normally work off descriptions of data and of the program. These descriptions include some items that are not included in the Ansi Cobol specification — for instance, items describing what makes the contents of a field valid for use for some purpose or another.

I can see no reason why maintenance could not take place at this program description. These abilities are the type of thing that have to be addressed in considering the generated vs. nongenerated Cobol argument. Just looking at source code isn't enough.

In appealing to the greats for support
(Continued on Page 40)

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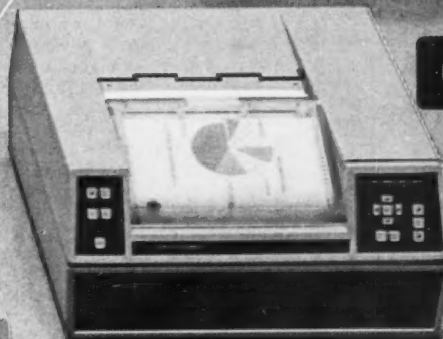
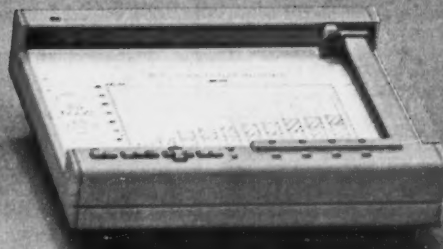
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READER COMMENTARY/ James Carlisle

Office of Future: More Than New Technology?

Office automation is not new. It is the logical extension of the systematic application of computers to business management.

Office automation includes management information systems, time-sharing, word processing — applications that have been around for 20 years.

Then what is different? Why all the concern over "the office of the future"?

The office of the future is much more than the conver-

gence of computer and communications technologies — it is a new approach to management communication and control. We can expect a number of strange encounters in the next decade as the new technologies are refined and introduced to management and professionals at all levels.

It is too general to define office automation as "increasing productivity and effectiveness of management through use of integrated computer and communications technolo-

gies." We need definitions for each kind of encounter.

First let's look at the kinds of automation:

1. Office automation of the first kind is the simple collection, processing, storage and reporting of numeric data (e.g., data processing).

2. Office automation of the second kind is the collection, processing storage and print-out of textual information (e.g., word processing (WP), typesetting, information retrieval).

3. Office automation of the third kind is the integration of discrete processing functions to allow existing office functions to be performed more efficiently (e.g., DP and WP for report writing, WP and communications for electronic mail, electronic mail and calendars for scheduling, voice, data, text and graphics for information management).

4. Office automation of the fourth kind is the personalization and customization of office communications and control systems to support a wide range of the manager's or professional's activity (e.g., multifunction workstations, personal computers, traveling and home workstations, total information control).

Most organizations today already have office automation of the first two kinds. Only a few hundred executives and some 20,000 to 30,000 managers and professionals have encountered office automation of the third kind. And office automation of the fourth kind is only a few short years away.

Communications and Control

Real automation in the office requires the careful examination and revision of policy for management communication and control. Without streamlining administrative processes, without a conscious determination to reduce administrative processing costs, all the newest technology will do little for net productivity in the office.

Technologies will provide the opportunities for both examination and change of office work. But it's really up to management to address the costs and problems of running the organization more efficiently and profitably.

Costs are changing more dramatically than ever before. Poor monitoring and forecasting of foreign exchange rates can cost corporations and government agencies millions of dollars on a single contract.

Government regulations and management reporting requirements grow exponentially for almost all organizations. A recent study conducted by a group of large

corporations found that 10% to 20% of their profits were spent on compliance with regulatory reporting requirements.

The cost of office labor, furniture, paper and filing seem to spiral upwards, with no end in sight. Yet productivity of the front office worker (the executive, the administrative staff, the line manager) doesn't seem to increase much.

The greatest costs of all may never show up on the balance sheet. These are the human costs of increased stress, anxiety and failure to cope with the changing nature of the environment and with the information explosion.

So where does office automation come in? As the panacea for the naive. As the catalyst for the realist who knows that the important are not solved by faster typing and prettier reports, by fewer secretaries and larger CRT displays.

Recommended Approach

Office of the Future, Inc., of which I am president, has developed an approach to the introduction of automation technology into the office which is based on support for the manager and his responsibilities, rather than on the technologies per se.

This process builds ownership and commitment of users, rather than passive or even hostile participation. The approach is more or less standard, but the solutions for each application area will vary with needs of the managers involved.

To develop office automation of the fourth kind, companies must begin with a detailed study of the office. The objective is to gain an understanding of the functions of the office — specifically, the methods and styles of the executive and how he interacts with his staff.

Since each office is different, the communication and administrative work processes should be analyzed to determine if excessive labor content or unnecessary delays occur. Most important is for the executive and his staff to identify areas for improvement which have significant bottom line implications.

For example, it may be critical for a bank lending officer to gain access to spread sheets or to credit files while visiting a customer. Or, excessive work may be performed in the preparation and delivery of monthly status reports to selected corporate customers.

Such detailed studies call for interviewing the managers, charting the work and infor-

mation flows, determining the critical factors in the communication and control processes (personal contact, information delays, mechanics of processing, etc.) and developing specific applications proposals with expected paybacks.

The first deliverable is a report outlining potential applications where improvements in productivity and effectiveness can be realized. These applications are evaluated in terms of expected results in better information for decision making, improved customer service, greater executive availability, and administrative cost displacement.

Further, the feasibility of implementing these applications can be determined based on the behavioral implications (changes to the work style and organizational structure) and the availability of technology.

The eventual selection of vendors is based on competitive responses to a request for proposals, outlining a set of business requirements for potential office automation applications.

The second phase involves the development of one or more prototypes. The prototypes typically utilize capabilities such as electronic mail, text editing, electronic filing, calendar maintenance and access to decision making data.

However, it is best not to determine the prototype configuration until the business needs are identified and management has agreed to their high priority.

Where Is the Payoff?

In the short run, each application must realize benefits in improved productivity and effectiveness as agreed to and specified by the user.

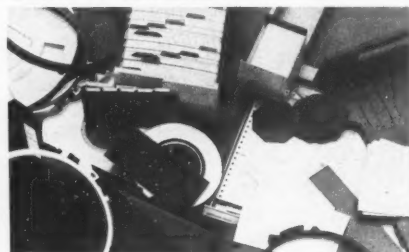
For example, in one bank a legal information system was installed and a \$235,000 reduction in time-sharing costs was realized. More importantly, however, the paralegal staff productivity was improved so much that the workload can be increased fourfold and staff reduced by two people. Further, the effectiveness of the lawyers was improved by allowing more time to work on legal issues rather than checking clerical work.

This approach emphasizes, through project team training workshops, expertise in the use of office technology. In addition, it takes an incremental approach with demonstrable results at each step.

Lastly, it recognizes the changing nature of the office and the need to customize solutions for each business.

Carlisle is president of Office of the Future, Inc. in Guttenberg, N.J.

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Cutting Program Upkeep Costs: Another View

(Continued from Page 33)

learning is clearly the most time-consuming (hence expensive), frustrating and dangerous part of the maintenance.

Failure to understand the logic is a virtual guarantee of failure during testing. By contrast, when the logic is well understood, program changes can be applied relatively quickly and risk-free. The "leave-it-better" philosophy of our shop is premised on the inescapability of the learning task together with the relative ease of the modification.

As we all know, Murphy's Law applies as much to program maintenance as to all other human endeavors. In particular, the logic that will have to be changed is always the most difficult of

the program. If, once we understand that logic, we not only make the required changes, but also take a little extra time to improve and clarify the coding, we can, by a kind of optimization process, guarantee that the next time this program has to be changed, the task will be easier than it is this time. (Our experience is that, with fix-only as the unit, learning runs from 5 to 15 time units, and fix-improve is about 1.5 time units.)

We do not recommend "improving" the entire program all at once — just those areas where you already know what you're coding. You'll get another chance next time. Ultimately the entire program looks pretty clean. At that point, further improvements can be realized by beginning to generalize the

cases for which the program is a solution.

(Our experience here is that such generalizing improvements pay off about nine times out of 10, which is nine programs that don't have to be written/patched for one-time requests. This, of course, is conditional upon

one's foresight.)

Finally, I would like to comment on whether such time "investments" should be made. Singer and I seem to agree that they should, one way or another.

Chase is programming manager for the public schools of St. Paul, Minn.

Fortran Readability Aided

(Continued from Page 33)

4. The use of LOGICAL variables and functions is an often ignored technique, which can improve readability.

Example:

```
PARAMETER MAX = 200
DIMENSION LIST (MAX)
LOGICAL IN, OVERFL
```

...

```
IF (.NOT. IN (LIST).
AND. .NOT.OVERFL (LIST, MAX))
+ CALL ADD (VARIAB, LIST)
```

The code is readable to the point where further explanation is not needed. The function OVERFL would probably print a "table overflow" diagnostic. (The length of the list is assumed to be passed in COMMON). Note that if 'IN' is .FALSE., OVERFL will not be called.

IMPLICIT and PARAMETER are available in a number of pre-Fortran/77 implementations.

5. Many compilers will accept literals in IF statements and in arguments passed to subroutines.

Consider replacing:

```
WRITE (6,100)
100 FORMAT (30HDO YOU WISH TO
CONTINUE (Y/N)?)
READ (5,101) REPLY
101 FORMAT (A4)
```

with:

```
CALL ASK ('DO YOU WISH TO CONTINUE
(Y/N)?', REPLY)
```

Such routines would be good to keep in a programmer's library; they simplify a main program and make it more readable.

I'm sure I have just touched the tip of the iceberg with these suggestions; there must be many more techniques existing. They are simple ways of improving the lot of the Fortran programmer.

Generated Cobol: How Structured?

(Continued from Page 35)

port, I think that Siegel should also include Grace Hopper. After all, this is a Cobol matter.

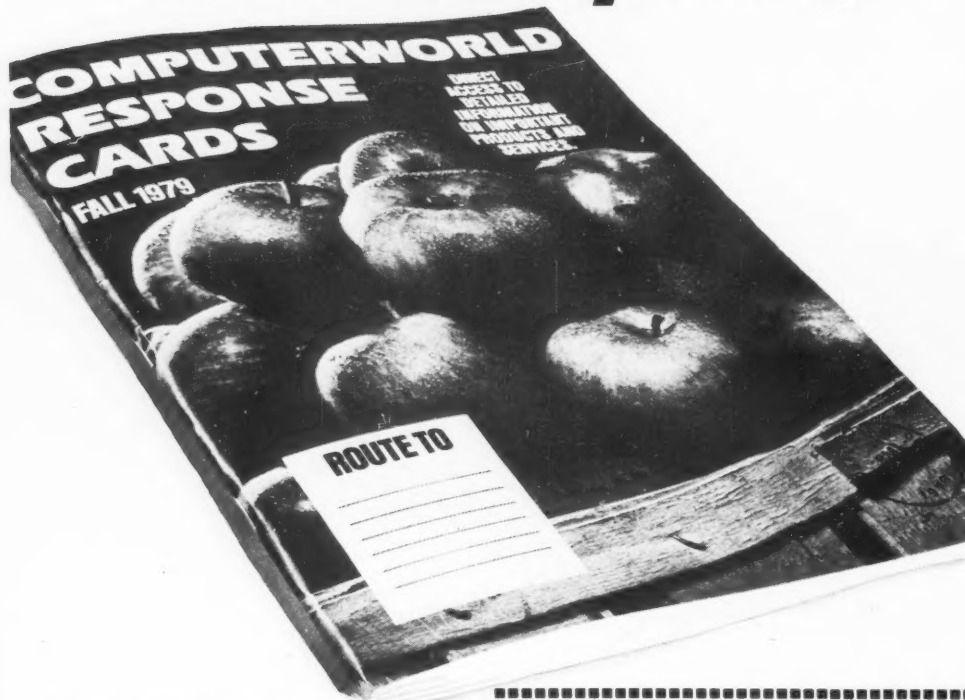
And, in the mid-1950s, when skilled programmers were confronting her with the inadequacies of her early Cobol output, her comment was that those criticisms were not welcome and strengthened the future of the automated programming. In showing a valid criticism, the critic can also show the way for the next program generator to be built.

Any Arguments?

Currently, I don't know whether structure is needed in Cobol generator output. I know that it is nice to have the option, but I'd really like to hear arguments about whether structured programming a la Professor Dijkstra applies to generated code, or if it is really a philosophy for handwritten programs.

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

IBM's Mills Tells Programmers: 'Combine Requirements, Opportunities'

By Don Leavitt
CW Staff

SILVER SPRING, Md. — Improving programmer performance begins with minimizing reinvention, developing new programs only as a last resort and then using the best possible technologies and management when program development is necessary.

The most cost-effective way to get a new programming system up and running is to discover that it already exists. The next most effective way is to discover a set of compatible components that can be integrated into the system with minimal program development.

"Of course, there is no way to make effective reuse of programming systems and components unless they are well-documented, at least in their external specifications but, even better, in their internal designs as well," according to Dr. Harlan D. Mills of IBM's Federal Systems Division.

Speaking to the ninth annual conference of the Association of Computer Programmers and Analysts (Acpa) here recently, Mills added that "it turns out, happily, that the

same technologies and management principles which foster effective program development also foster program reusability."

To put those thoughts into action, however, means that the programmer — and the manager — must really understand the requirements of whatever they are asked to do. "Don't do the wrong thing well," he urged his audience, but "be ready to combine requirements with opportunities."

The opportunities may be limited by available equipment. If that is the case, Mills said, it is important for the DP staff, sometimes conferring with the user, to work out compromises that will get the job done as well as possible.

To minimize reinvention, the development staff should understand existing systems and existing components. That is harder to do, in many cases, than to go into new development; but it could lead to new systems — built of tested, debugged pieces — being ready much faster, he added.

In development work itself, the need to design the proposed system before getting into coding and testing "should be obvious, but

apparently still isn't," according to Mills. He noted that programmers really do need a "bottom up" feel for what the system is to do, before they can apply "top down" structured programming techniques.

Urging the technicians who make up Acpa to go beyond structured programming, Mills pointed them toward the concepts of prime programs, program correctness tests and data abstractions. Prime programs, he said, are a new foundation for structured programming theory and for the modification of unstructured programs.

First conceptualized in a dissertation at the University of Waterloo in 1975, prime programs are defined as one entry/one exit programs with no multistep one entry/one exit subprograms. They therefore perform only one function and are easily understood.

The comparison to prime numbers is quite deliberate, Mills said, noting that prime numbers are divisible only by themselves and by one. The "most exciting" application of prime programs is the help they can provide in the understanding of unstructured programs, Mills said.

The concern for program correctness also has links to mathematical theory, but the basic question is extremely simple: Is the specification function the same as what has been programmed?

Stepwise refinement — breaking a program into small primes and proving the correctness of each new prime — is the basic approach to solving that problem. Mills stressed, however, that most programmers do not need to get involved in strict mathematical proofs of correctness.

"After all, you're all professionals. If you can convince someone else on your staff that your program is correct, it probably is."

Mills' concern for data abstractions appears to be similar to the concept of data independence as used with many data base management systems. The IBMer said data abstraction approaches take advantage of "centralized service" for the storage and retrieval of data.

No access to the data is allowed except through the central services, he noted. Since different users can be told about different aspects of the overall data base, the central services permit "hidden data representations" — much like the subschemata of data base systems.

'Cops' Said to End DP Crimes For Systems Running CICS

YONKERS, N.Y. — A software package just announced by Computer Security Systems, Inc. is capable of completely eliminating the threat of computer crimes in an IBM CICS environment, according to the vendor.

The CICS On-Line Protection System (Cops) is made up of several distinct components including support for sign-on protection, resource utilization protection, system enforcement, the data security officer (DSO) function, audit logging and management reports, a spokesman said. Since these components are set up in modular fashion, the system can be installed one feature at a time, at whatever pace is comfortable for the using organization, he noted.

Cops is the only system in which passwords are dynamically assigned by the system at the time of the individual user's first sign-on, the spokesman claimed. The password is flashed on the user's screen for "only a few seconds," and the user is responsible for it after that.

Neither the DSO nor Cops itself has a record of the passwords, but the system can determine if a password being entered is appropriate for the user. If not, the system blocks use of the CPU use and notifies the security officer.

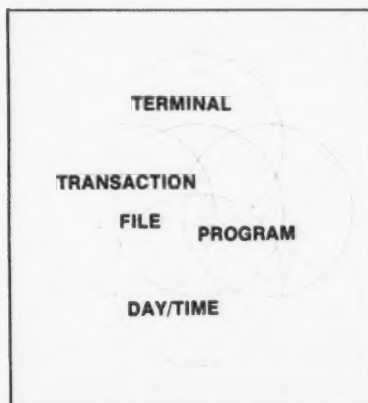
If a user forgets his password, the DSO can authorize a reinitialization during which Cops invalidates the prior password, calculates a new one and flashes it to the user.

The term "resource utilization protection" refers to Cops' ability to control which transactions, programs, terminals and even day and time of day are available to individual users. It can determine, for example, that it is inappropriate for any user to be accessing a check-writing run at midnight.

Cops also generates logs of attempted security violations and system employee status reports.

Developed by Telecommunications Technology Corp., Cops is operational under IBM's CICS/VS Release 1.3 and above. It costs \$18,000 plus an installation fee which averages \$3,000, according to the spokesman. Maintenance after the first year costs 10% of the license fee.

Computer Security Corp. is at 1730 Central Park Ave., Yonkers, N.Y. 10710.



The vendor uses this diagram to show how radically 'Cops' can limit the chance of misusing an on-line system.

For DOS, DOS/VS Users

Console Management Backed

MISSION VIEJO, Calif. — The Console Manager (Conman) package from Jason Data Services, Inc. provides IBM DOS, DOS/VS and compatible systems with console message spooling and a range of facilities to ease the operator's function, a spokeswoman said.

The basic spooling capability frees the operator from dependence on IBM's 1050 console typewriter as the instrument for handling messages to and from the system. Instead, messages are routed to a log file or to an IBM 3270 CRT terminal.

JCL as well as console messages can be displayed that way, which boosts the speed of the operation to the extent that the electronics of the CRT unit are faster than the electromechanics of the 1050.

In addition to the message spooling, Conman provides for the printout of all messages on either the 1050 or the user's line printer at the end of the job, for historic purposes, or only at an abnormal end of job, for documentation and resolution of the prob-

lem that led to the Abend.

The package supports multiple outstanding reads, enabling the operator to work on several responses without worrying about the system halting because one of the messages has yet to be answered. The scrolling of the messages and the way they are flagged by Conman is said to be easier to read than on competing systems.

Operators are allowed to answer reads before they appear on the screen, Jason said.

Conman allows users to assign their own values to Program Function (PF) and Program Answer (PA) keys. This function supports prefix assignment, "canned" message and text insertion for the PF keys and canned messages for the PA keys, the spokeswoman noted.

The package does not require a partition but does use 20K to 30K bytes of real memory, depending on the options selected. It costs \$6,240 or \$130/mo, Jason said from 24871 Pylos Way, Mission Viejo, Calif. 92691.

'Dpro' Tunes Dasd Use

GAITHERSBURG, Md. — The Disk Pack Reorganizer (Dpro) package from Royal Software Associates is said to provide analysis of Dasd file utilization for IBM or compatible installations running under OS or OS/VS.

Any number of Dasd volumes can be analyzed simultaneously. The analyzed data can be captured by IBM's General Trace Facility (GTF) or by a simple data collector program provided with the Dpro package, a spokesman said.

The package provides a variety of reports. These include documentation showing data set utilization on all volumes and on each volume, utilization of members in partitioned data sets (PDS), the time

spent in moving the read/write heads between files and suggested reorderings of data sets to minimize interfile seek time, the company explained.

Dpro also provides output that can be used directly with other software. Control cards, for example, are produced for use as input to the Kompaktor program from Innovation Data Processing, Inc., which handles the actual reordering of data sets in accordance with Dpro's recommendation.

Dpro is distributed on 9-track, 1,600 bit/in. magnetic tape and costs \$1,500 for the first year and \$250/yr thereafter. Royal Software Associates is at P.O. Box 3057, Gaithersburg, Md. 20760.

'Control/SMF' Helps Users Manage IBM Data Centers

SUNNYVALE, Calif. — A data management software package for users of IBM 360, 370 and series CPUs is available from Boole & Babbage, Inc.

Called Control/SMF, the system is divided into two components: a performance reporting system and a job accounting system. The performance reporting system incorporates the vendor's former CPA and FMR packages, and the job accounting system is reportedly an upgraded version of CAS.

Current users of either the CAS, CPA or FMR packages will be allowed to convert to Control/SMF at no extra charge.

Control/SMF will also interface with other Boole & Babbage control series

products: Control/IMS, Control/IMS Real-Time and Control CICS, the vendor added.

Using the system measurement facility built into the IBM OS and DOS operating systems, Control/SMF can produce more than 40 reports and graphs formatted for cost accounting, budgeting, chargeback accounting, workload analysis, long-term performance evaluation, planning and forecasting, the vendor said.

Control/SMF will create management summary reports on the data center's expenditures. It will also evaluate service levels to users, the vendor said.

Control/SMF costs \$9,000 for a single CPU; special rates for multiple CPUs are available. The initial fee includes the first year's maintenance. Subsequent maintenance costs \$1,800 a year, the vendor said from 510 Oakmead Parkway, Sunnyvale, Calif. 94086.

Gejac Updates RSX-11M Tool

RIVERDALE, Md. — Users of Digital Equipment Corp. PDP-11 processors running under the RSX-11M V3.2 operating system can now use a revised version of Gejac, Inc.'s Arsap accounting and chargeback system.

A proprietary software package that allows the PDP-11 system manager to monitor computer usage, measure system performance and bill for resource utilization, Arsap was formerly available only for the RSX-11M V3.1 operating system. The revised Arsap offers an improved report formatting segment that creates easier to read reports, according to Gejac.

Arsap reports have been switched to all upper case letters. Since some users have upper case-only printers, the previous version offered both upper and lower case reports, sometimes leaving blanks in the spaces where lower case letters were supported to be, Gejac said.

The accounting and chargeback system will support DEC's Fortran and Fortran IV Plus, the vendor added.

Arsap now offers support to multiple disks; the previous version only supposed one disk per user. In addition, the revised Arsap offers an expanded documentation and easier installation.

A one-CPU license costs \$2,995. Special rates are available for multiple CPUs, the vendor said from P.O. Box 188, Riverdale, Md. 20840.

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Tape Manager Updated Vault Management Enhanced in 'UCC One'

DALLAS — University Computing Co. (UCC) recently announced an additional version of its UCC One tape management system.

UCC One monitors and reports the status of all tape data sets. It also helps prevent JCL errors or operator overrides. The system provides its own password security system and produces a variety of standard

reports.

Version 4.5 reportedly enhances the vault management system to simplify off-site storage of tapes. Version 4.5 also makes it easier to specify sets of data sets, each with a common index receiving the same vaulting criteria, but the sets will be treated as separate groups when being vaulted, UCC said.

Tests options have been added to allow users to generate normal reports with contents reflecting what would happen in an actual run. No tape management data is changed during the test option, the vendor said.

An additional integrity check has been added to the existing IPL checks to prevent erroneous IPL dates, UCC said.

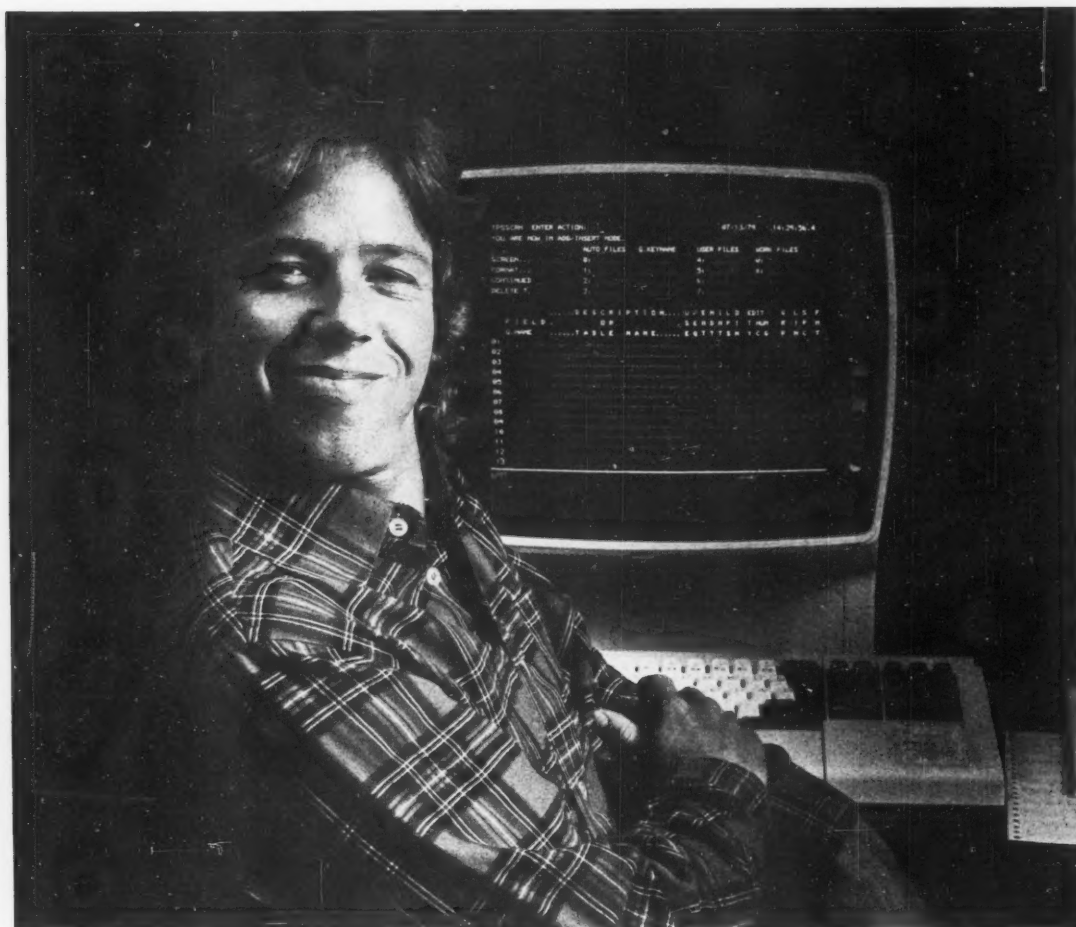
A conversation/installation aid now extracts information from tape header labels and builds records that go into the UCC One data base.

Other capabilities include display of tape information on the console; comparison of tape header information with the UCC One data base; and the ability to erase a tape in scratch status, according to

UCC.

Interfaces between the UCC One on-line update/inquiry system and IBM's CICS or Applied Data Research, Inc.'s Roscoe have been rewritten to be a more integral part of the system, a spokesman said.

Version 4.5 costs \$13,900, he said from UCC Tower, Exchange Park, Dallas, Texas 75235.



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PDC to Enlarge Newsletter On Data Base

PRINCETON, N.J. — The "Data Base Newsletter," published regularly by Performance Development Corp. (PDC) for the past seven years, will be expanded, starting in January, to encompass more developments in the data base and data resource management field.

In addition to the data base and data base management system (DBMS) coverage already provided, the newsletter will cover data dictionary systems, standardization, data base administration, data base design and other related areas, according to editor Ronald G. Ross.

Among the regular departments in the bimonthly publication will be "Data Viewpoint," featuring commentary, primarily by Leo J. Cohen; "Product Discussion"; and "Current Trends." Interviews with leading figures in the field of data resource management will also be highlighted, Ross noted.

A year's subscription to the publication costs \$45 (\$49 outside the U.S.). PDC is at 1101 State Road, Bldg. P, Princeton, N.J.



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DBMS Helps Bring Promise of MIS to Fruition

By Douglas L. Harmon

Special to CW

The concept of integrated MIS was held, in the late 1960s, to be the keystone upon which all business DP should be built. By and large this promise has not come to fruition because three fundamental abilities were lacking: (1) the ability to store and manage massive amounts of data; (2) the ability to integrate data from disparate sources; and (3) the ability to respond to rapidly developing and changing user requirements.

The advent of commercially available data base management systems (DBMS), coupled with nonprocedural languages, has provided two of the primary requirements for implementing the integrated MIS concept. The successful use and implementation of a DBMS is, as one might suspect, a bit more difficult than calling a vendor and loading the DBMS to disk.

Like most DP innovations, the DBMS concept suffers from oversell and misunderstanding. What follows is a distillation of rules and observations gained from three years experience in analysis, selection and implementation of DBMS in an MIS environment:

- Unless a competitor offers a free DBMS, choose one that offers a nonprocedural, very high-level language. One frequently sees advertisements for DBMS claiming that use of a nonprocedural language will cut development time by 50% and rewrite time by 80%. Given an orderly environment, these claims are not at all extravagant.

We very often model a system or module four or five different ways before selecting a particular strategy and proceeding with full-scale development. And our software production schedules typically run in weeks, not months.

- Select a DBMS that offers extensive capabilities for validation, audit, rollback and recovery, then add your own redundant recovery capability. No matter how sophisticated and capable the DBMS recovery utilities are, you will eventually either lose data or lose the ability to specify which data has been input to the data

base and which data has not.

When this happens, it is imperative that you have at least two distinct sources concerning the exact state of the data base prior to the error. When you can no longer tell a user which constituent data comprises the information on a report, you may as well shut down the system.

- Because you will almost never define all data base design requirements before the

data base goes on-line, look for a DBMS that allows schema respecification with no impact on existing data.

At a minimum the DBMS must allow (1) addition and/or deletion of data fields to/from records; (2) addition and/or deletion of member records to/from owner-member sets; and (3) indexing of a data field after the data base has been created.

Imagine, for example, you've

been told for months that for each part the Ajax Co. purchases, there is one and only one vendor for that part. Two days before system implementation, you are in a meeting and some nondescript character from shipping speaks up and says, "Well, yes, that's true except for widgets. We have at least four different vendors for widgets."

When that happens you'd be well-advised to be armed with

a good DBMS rather than a tutorial on DBMS internals and lame excuses about why you cannot do proper reporting on widget vendors.

- A good DBMS interfaced with a nonprocedural language makes control of production software more exacting. With a procedure-oriented language like Cobol, changes to production software require a lot of work. (Continued on Page 46)

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MIS Promise Comes to Fruition With DBMS

(Continued from Page 45)
When a large system has been written in Cobol, one doesn't entertain rewrites lightly; they are (or should be) well planned and managed.

With a nonprocedural language, it's very often the case that the administrative process for changing a piece of software takes a lot longer to complete than the software change itself. The desire to respond to user requirements, coupled

with the ease of nonprocedural rewrites, can result in lax control over the configuration of the production software.

• *A DBMS cannot plan, decide or make value judgments.* This point seems laughably trivial to experienced DP personnel, but to the user who knows DBMS to the level of vendor literature, it comes as a deep and resented revelation. DBMS are sometimes over-

sold to the point that a user expects only to shovel disjointed clumps of data at the DBMS and the DBMS will make sense of it. The DBMS will make up next years budget, decide how to staff each department, etc.

It is incumbent upon the DP people to sit down with the users and make it clear that the DBMS will keep track of where data is stored. It is a well-designed data base and

properly developed software that makes information (i.e., sense) out of data. Users are not paid to know these things; you are.

• *A DBMS will cause an organization to decrease the amount of information processing that it does and will cause an increase in the amount of data processing.* (If not, either you do not need a DBMS or it has been improperly implemented.)

With a well-run DBMS, there will be very few analytical or management-level personnel sifting and collating data to provide information. There will be more data entry personnel providing raw material on the data end of the data-information transformation.

Make sure the user understands that having a DBMS does not cause an absolute drop in effort. The names and pay rates of the persons providing the effort change, and that is gratifying to most management people.

• *You will end up wishing you had a relational DBMS.* If a user can ever imagine a need for any two data fields in any two data bases appearing together on a report, he will ask you for it eventually. Nothing is unreasonable to someone who sees \$100,000+ shelled out for a DBMS, plus all those overpaid computer gnomes, plus the high-priced machine — all things are possible at those rates.

Experience with hierarchical DBMS and with a fairly effective relational/hierarchical DBMS utility leads to the conclusion that relational structures hold the most promise for the next generation of DBMS.

If system overhead can be brought within reasonable bounds (the main problem with the relational utility DBMS discussed above), and if current relational theory can find a simple and elegant manifestation in a commercially available DBMS, the third requirement for fulfilling the promise of integrated MIS will be available.

Harmon is deputy manager for MIS development, Planning Research Corp., Data Services Co., San Diego, Calif.

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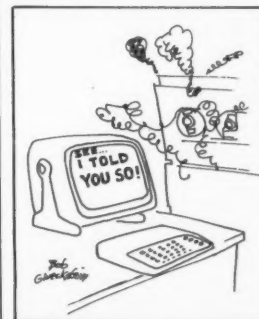
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It's the Perspective That Counts

Technicalities Not Vital in 'Going Data Base'

By Richard D. Lenear

Special to CW

Working to understand what the data base environment would mean to us at AMF, Inc.'s Wheel Goods Division was, happily, the overriding consideration when we began to look at data base management systems (DBMS) two or three years ago.

Without that basic understanding, the technicalities are irrelevant. The data base environment requires a different approach to DP.

The features in a DBMS can

reduce programming and testing effort, provide the flexibility required for future system integration and/or modification and install system integrity and reliability. In other words, with DBMS we have a tool to help us do more with less effort.

The features that need to be used effectively are data independence and maintenance of natural data relationships.

Data independence is one of the largest benefits of today's data base managers and can be

the least used. A one-line rule for data independence would be: "Provide only those elements (data fields) necessary to satisfy the task."

Some data base users are defining record layouts and passing back and forth those whole records. These records may be copy books which lessen the evil considerably; however, the fact remains the same: Those who process records are not taking advantage of the element processing concept of data independence!

In order for us to utilize the data independence feature, one must start thinking in terms of elements (data fields), not records.

Data Relationships

Natural relationships exist among all the various pieces of data we collect. Those relationships can be disregarded or overlooked in quests to design the most efficient record-related system.

Demands from the next generation of information and the next and the next, however, eventually force a complete overhaul of the original "efficient record-related systems."

Maintenance of natural data relationships can virtually eliminate such disruptive reworking of established but fixed systems. Natural data relationships scarcely change, so it only makes "cents" to organize data in this manner.

From the most significant to the least, each piece of data should be viewed as a building block contributing to the construction of the whole. Each piece must be identified and classified as to its use, its effects on other elements and its format as information.

A one-line role for maintenance of natural data relationships would be: "Establish and maintain linkages that are natural within the data." Do not install linkages for reporting or processing conveniences.

Data must be viewed as a resource of the company, as being available to all users and as a tool for making decisions when combined with its context.

Primary Role of DBMS

The primary role of a DBMS is to provide the solid yet flexible foundation on which to build a management information system (MIS). The objectives of data base technology are to:

- Eliminate or reduce the technical maze traditionally required to provide information to users.
- Ensure the accuracy and integrity of the data through common nonredundant data, maintenance of record relationships and journaling.

• Provide optimal access to data for users, particularly in an on-line environment.

• Provide the capability to interrelate data files to achieve a truly integrated organizational data model on the computer.

• Enhance the overall performance and efficiency of hardware and especially DP personnel.

These efficiencies are somewhat measurable within minimum and maximum boundaries and can be used to cost-justify a DBMS. The real cost justification, however, which is more difficult to measure, lies in the pure value of the information itself.

Having developed that perspective, the second step in our migration to data base technology was to select the DBMS. Cincom Systems, Inc.'s Total fit our philosophy for building an MIS better than the other systems we studied.

A network type of DBMS supported our philosophy that the data base should model our organization and not any one application. Yet it would also allow us to build an integrated corporate data base in a modular fashion — system by system, as priorities dictate.

Additionally, Total provides us with the most flexibility to help our MIS adapt to our changing business environment. To take advantage of this capability, we designed our data base not for a specific application, but rather around the natural relationships that exist among data at AMF.

The ease with which we learned to use Total allowed more time to implement it, and we felt this was a very significant benefit. The absence of bronze bells and wooden whistles enables us to maintain our proper perspective as we design and implement systems under data base.

And it is this very simplicity that allows us much flexibility

in designing our data base and manipulating its data.

The Implementation Phase

Once we made our choice, the next step was to begin implementation. Our first rule of thumb for a successful implementation is that our data base design must model the business function we are automating.

This approach also helps eliminate the impact of change in the company's information requirements.

We also make optimum use of a facility which allows us to redefine records in a Total transaction file. This capability allows better performance and flexibility of growth and modification. For the same reason, we take full advantage of data independence, which should be a major criterion in the selection and use of any DBMS.

System as Checklist

We make no attempt to convert systems designed before acquiring a DBMS directly to data base. Rather, the old system is simply used as a checklist to ensure nothing is omitted when a system redesign is undertaken.

There are a number of ways the data base can be tuned for maximum performance and efficiency. They should be explored and then put to use to the extent of the installation's particular needs.

Amid all of the confusion about what a DBMS really is, we are developing what we feel is a proper perspective of the role of data base technology in an organization. Keeping that perspective in mind, we selected what is for us a very functional and flexible DBMS — one that will complement our organizational objectives rather than personal whims.

Lenear is a data base administrator with AMF, Inc.'s Wheel Goods Division in Olney, Ill.

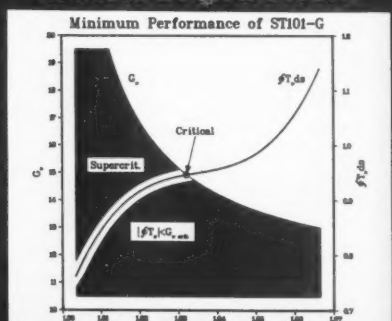


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'Manman' Moved to V77s

BLUE BELL, Pa. — The Manufacturing Management (Manman) system, originally developed by ASK Computer Services, Inc. for Hewlett-Packard Co. environments, has been adapted by ASK to run on Univac V77-600 and V77-800 minicomputers.

Manman includes seven on-line application modules integrated by a common data base. Operations covered by the modules are inventory control; purchasing; work-in-process control; bill-of-material processing; material requirements planning (MRP); capacity planning and scheduling; and cost accounting, a

Univac spokeswoman said.

Running under the Vortex II operating system, Manman also includes data entry editing support and generation of the proper transactions to adjust all affected records once a user's transaction has been validated.

The package requires a 256K-word V77 with printer, magnetic tape, disk and communications facilities. It costs \$50,000, which includes installation certification and the first year of Manman maintenance, Univac said.

First deliveries of the Univac version are slated for May.

Checks Hundreds of Lines at Once Resource Management System Introduced

By Brad Schultz
CW Staff

McLEAN, Va. — A resource management system reportedly capable of measuring hundreds of communications lines simultaneously is now available from Tesdata Systems Corp.

Coming close on the heels of competitive releases [CW, Oct. 22], Tesdata's unveiling of the MS 109 system gives the user much to consider when trying to maximize network reliability.

According to Tesdata, the MS 109 "immediately" detects net-

work or line failures and response time problems on individual lines and devices. The system also provides "a historical base for projecting network growth and planning future configurations," a spokesman stated.

Called a "building-block com-

ponent" of the vendor's Advanced Management System (AMS) series of resource managers, the MS 109 acquires such data as response times, host delay, character traffic and negative acknowledgment characters (NAK) on each terminal and assesses availability and lines and control units.

Three Components

The system has three basic components: line interface modules (LIM); a communications processor module (CPM); and network reporters (NR) (see figure Page 50). The data collected by the MS 109 can be displayed in real-time on one of its NRs and/or stored in the AMS data base for hard-copy reports and long-term trend analysis.

As a secondary subsystem linked to the AMS Master Control System, the MS 109 reportedly can correlate 109 different performance measures to estab-

(Continued on Page 50)

Petroleum Concern Oils Operations Of Subsidiaries With Aid of Net

By Kent Krause
Special to CW

HOUSTON — A major U.S. corporation is meeting the diverse demands of three large subsidiaries with a data communications network that delivers high reliability and cost-effectiveness.

As one of the first firms to install IBM's 3033 mainframe and Systems Network Architecture (SNA), Occidental Petroleum ranked as the nation's 27th largest company last year, with 34,000 employees and revenues of \$6 billion.

Each of Occidental Petroleum's three principal divisions is an enormous company in its own right, and each has its own ideas about how networks and DP resources should be managed. The divisions include Occidental Oil and Gas Co., which searches for oil shale and geothermal energy sources while producing oil in Libya, the North Sea and Peru; Island Creek Coal Co., one of the largest U.S. coal companies; and Hooker Chemical Co.

These divisions require tremendous computing power — for administrative and financial information services as well as for a vast amount of technical data to support engineering units.

The challenge of meeting the requirements of each division while working in the best interests of the parent company is the responsibility of Occidental Systems, Inc., also known as Oxy

Systems.

The subsidiary has responsibility for Occidental Petroleum's entire corporate DP network, which spans the U.S. and links to South America and Europe.

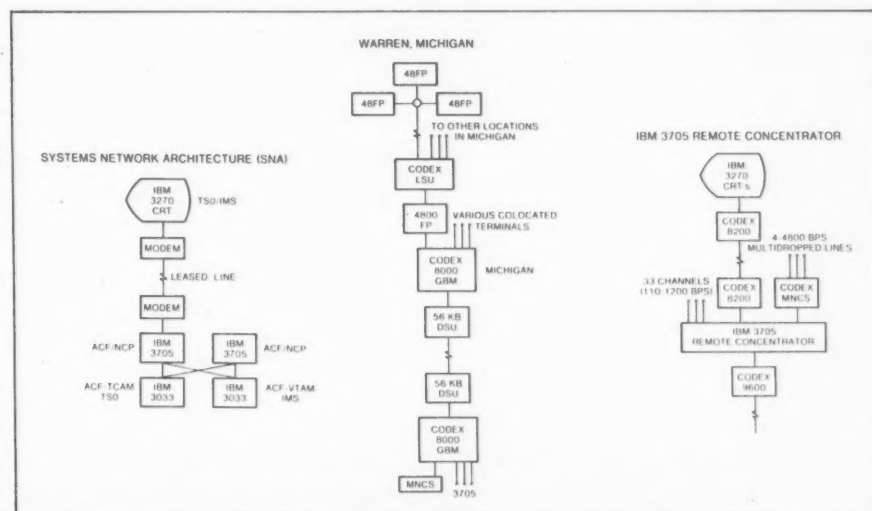
Developing overall network strategies and selecting hardware and software components for users, Oxy Systems' Computer Services group functions out of a center in Houston, where two IBM 3033s and a vast array of peripheral equipment reside. The

peripherals include five 3705 front-end processors, four 2305 high-speed drums, more than 60 IBM 3350 disk drives and one cavernous room for tape storage.

Adding about one 3350 a month and growing at the rate of some 250 terminals per year, Oxy Systems is planning and managing one of the largest and most sophisticated data networks in the country.

A Multipoint Network Control

(Continued on Page 54)



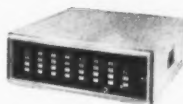
From left to right: Occidental Systems, Inc. has two IBM 3033s, supported by IBM's Systems Network Architecture in Houston; the line between Houston and Warren, Mich., runs in the 2,400- to 9,600 bit/sec range; an exploded view of the way IBM 3705s function as remote concentrators.

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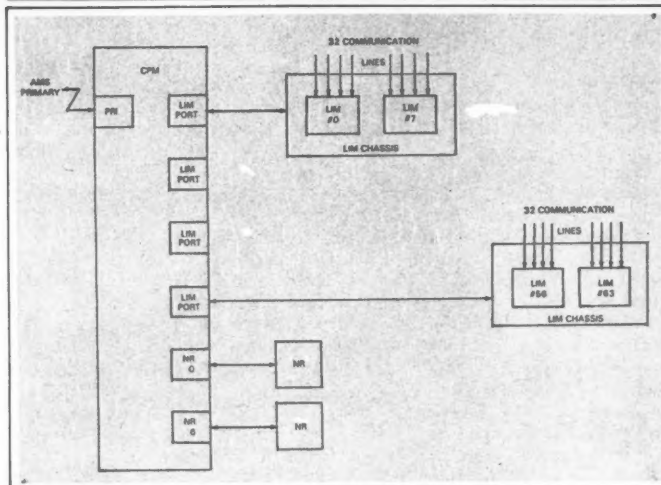
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The MS-109 contains Line Interface Modules (LIM); a Communications Processor Module (CPM); and Network Reporters (NR).

System Checks Many Lines

(Continued from Page 49)

lish the cause of network bottlenecks.

The MS 109's LIMs and CPM are packaged either in a rack-mounted chassis or optional cabinets, the spokesman noted. In most installations, the CPM and LIM chassis will be installed either in modem racks or the technical control center. The NRs are terminals that can be placed "wherever required to be most useful in minute-by-minute management of telecommunications."

Each LIM chassis houses eight LIMs, each of which can monitor up to four communications lines. The LIMs are interfaced to the user's lines via an interface adapter cable that attaches at any point on an RS-232 interface.

The LIMs reportedly collect a fixed set of data on each line and store the

data in buffers where it can be used either by the NR or by the CPM.

With an NR, the user can query data collected by a LIM. This data is displayed as either an exception alert or in response to such queries, the spokesman explained. The CPM accumulates data from the LIMs and sends it to the AMS data base for report generation or trend analysis.

Because the LIMs, CPM and NRs communicate with each other via an RS-232 interface, the CPM can be located at a distance from the AMS facility. And the LIM chassis and NRs can be remote from the CPM if modems and telephone lines are employed.

The LIMs are supported by software that oversees data collection. Up to two different protocols can be accommodated by software changes.

Through Tesdata's Performance Measurement Language (PML), the user can engage the CPM's software to determine which network performance measurements are taken by which LIMs. The PML compiler executes on the AMS system and allows the user to define in English statements the measurements included in the data base.

In the NRs, Tesdata has included software that allows the user to select predefined display formats via the terminal's programmable function keys. Once a format is selected, the user can choose the measurement's content and specify the lines, control units and terminals to be studied.

With deliveries reportedly beginning immediately, the cost per line of MS 109 can be as low as \$700, depending on the user configuration, Tesdata stated. This would translate to a cost per device of \$37.

Users can also begin a comprehensive data communications management program that includes the AMS hardware and software along with a 32-line MS 109. The program costs \$128,000.

Tesdata is located at 7921 Jones Branch Drive, McLean, Va. 22101.

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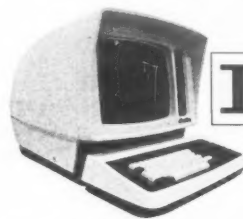
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Portable Devices' Reliability Almost 100%, User Reports

By Deborah Wise
Special to CW

ST. LOUIS — A steel mill here said it has found hand-held terminals to be nearly 100% reliable for broadcasting input to remote CPUs.

Granite City Steel, a division of National Steel Corp., installed the portable terminals for inventory control. According to John D. Carter, a senior systems analyst, "The only time we would have difficulty is if the host computer were to become inoperable."

Introduced a year ago, the terminals have already reduced costs enough to pay for themselves, Carter said.

The terminals feature two-way FM radios, touch pads and 16-digit LED readouts that enable data to be communicated to and from remote field locations at a rate of 1,200- to 9,600 bit/sec via UHF airwaves. Granite City Steel had to apply to the Federal Communications Commission to gain access to a UHF frequency.

The single frequency accommodates all the terminals in use at present. The company would have to apply for another frequency, however, if a new computer center were established.

Granite City Steel uses the RDX 1000 portable data terminals from Motorola Communications and Electronics, Inc. The terminals transmit to IBM 370/15 and 370/158, which have a combined memory capacity of 1M byte. The configuration employs IBM 3270 software along with a Tcamp Message Process Handler and an in-house message monitor to control the programs.

Average Range

Carter estimated the average range of the terminals to be between one half and three quarters of a mile, with a maximum range of a 1.5-mile radius from the computer center. Although the area surrounding the Granite City Steel compound includes steel storage warehouses and electric cables, these do not interfere with the terminals' transmissions, Carter said.

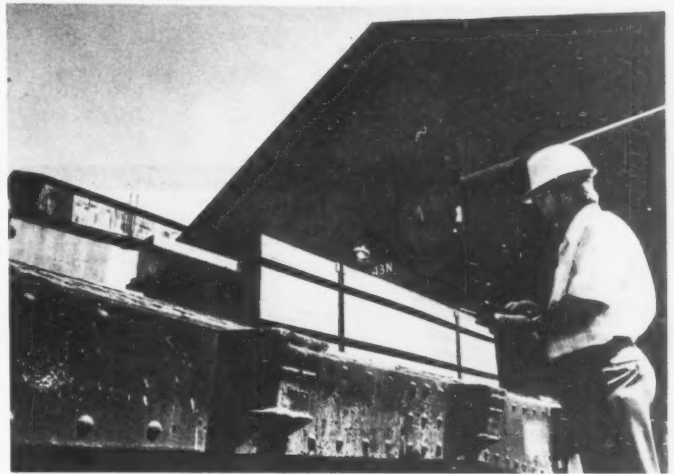
"I honestly feel that in the inventory control area, where you have movement of material, it is important to have current location information for concise, accurate records of movements in and out," Carter said. Since the installation of the terminals, the input of information has almost tripled, resulting in more efficient service and customer satisfaction, he added.

The company experienced no resistance from employees when the terminals were introduced. As input in-

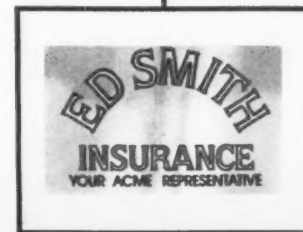
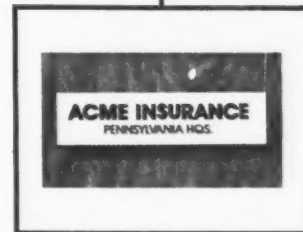
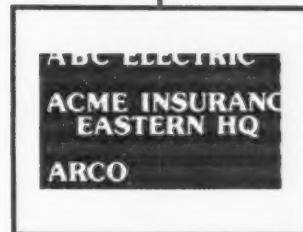
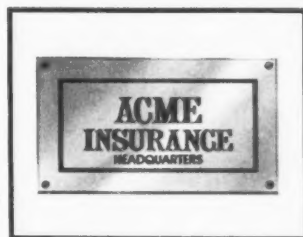
creased, so did work incentive rewards, Carter noted.

Granite City Steel plans to increase its use of the portable terminals to locate railroad cars within its 1,300-acre compound. The terminals will collect up-to-date information on the location and status of the cars. The firm pays only for the time each wagon is on its property, so by eliminating delays in rerouting idle cars, costs will be reduced.

Another prospective use is the collection of preventive maintenance information to identify machinery failure at the earliest possible opportunity and thereby save lengthy delays and repair costs.



Systems analyst John D. Carter enters the location, number and status of Granite City Steel's rail cars into his hand-held terminal.



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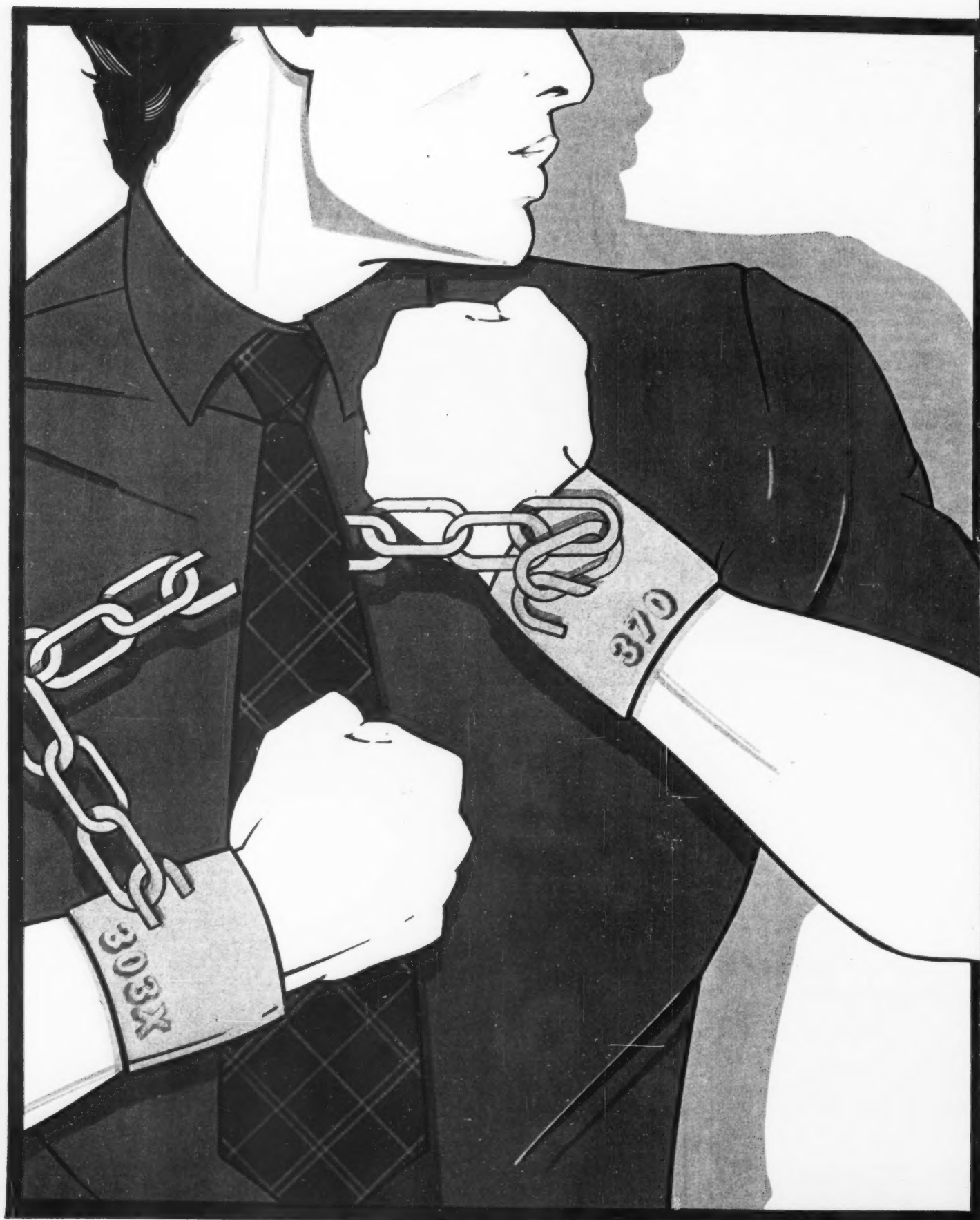


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Intel introduces FAST-3805, the Semiconductor Disk that unleashes the full paging power of IBM CPUs.

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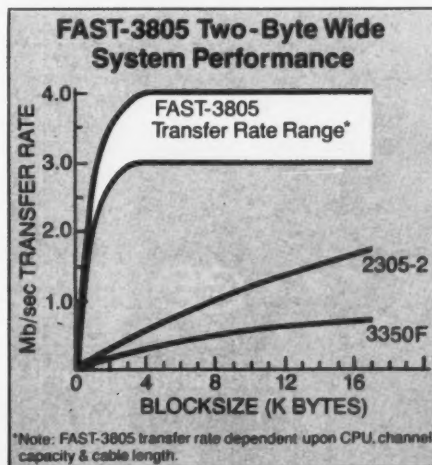
	INTEL	3350F	2305-2
Avg. Seek Time (msec)	0	0	0
Avg. Latency (msec)	0.4	8.4	5.0
Transfer (Mb/s)	1.5-4.0	1.2	1.5
Capacity (Mb/s)	12-72	1	11.2

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Network Greases Operations for Petroleum Firm

(Continued from Page 49) System (MNCS) from Codex Corp. has been installed to bolster reliability at one of the network's most interesting links — the one between Houston and upstate New York.

A large concentration of terminals is located near Niagara, North Tonawanda and Grand Island in New York. Running multiple lines from each terminal site to Houston would

have been prohibitively expensive. Obviously, some kind of remote concentrator was needed.

Innovative Approach

Taking an innovative approach, Occidental became the first company in the U.S. to install an IBM 3705 front-end processor as a remote concentrator. The 3705 drives a single full-duplex line at 9,600 bit/sec to the Houston data

center. Multiple diagnostic and restoral commands initiated on the MNCS console allow the New York operators to identify system malfunctions and restore operation.

Although most troubleshooting on the corporate network is done from Houston, Oxy Systems elected to distribute communication control to remote users of the New York-Houston line. The 3705 in New York drives a large variety of terminals at various

speeds and under different protocols.

The link has 33 channels running in the 110- to 1,200 bit/sec range on the input side of the 3705 to accommodate Teletype Corp. -compatible asynchronous terminals. The 3705 also connects several multidropped 4,800 bit/sec Synchronous Data Link Control (SDLC) communications lines.

IBM 3276s are also connected and use Codex's 8200 local distribution service unit, which allows terminals to run at any speed from 2,400- to 19.2K bit/sec.

SNA Components

Occidental Petroleum runs the following SNA component:

- Advanced Communications Function/Telecommunications Access Method (ACF/Tcam).
- ACF/Virtual Telecommunications Access Method (ACF/Vtam).
- Network Operator Support Program (Nosp).
- ACF/Network Control Program (ACF/NCP).
- SDLC.

ACF/Tcam and ACF/Vtam link IBM's Time-Sharing Option (TSO), IMS and remote job entry applications to the network's terminals. Nosp facilitates operation of the network apart from other functions of computer operations. And ACF/NCP resides in three of the five 3705 controllers installed at the Houston data center.

For two years, SDLC has been the protocol most of the network's terminals use to communicate with host computer systems. These terminals include IBM 3771s, 3774s, 3775s, 3776s and 3777s for batch transmissions, as well as IBM 3274, 3276 and 3278 CRT stations and the vendor's 3767 hard-copy units for interactive use.

The SNA features have increased terminal and communications line use and substantially reduced network costs. SNA has also allowed greater flexibility in separating work loads between CPUs. For example, TSO need no longer run on both of the Houston data center's computer systems — a situation that saves resources and reduces the cost of software licenses.

Oxy Systems is taking advantage of current Digital Dataphone Service (DDS) tariffs with a 56K-byte leased line between Houston and Warren, Mich. Costs for DDS lines at speeds to 9,600 bit/sec are essentially the same as the older analog circuits.

Krause is manager of network communications at Oxy Systems.

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Al Netten, Vice President,
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Tektronix Terminals Get Access to Net Design Tools

GREAT NECK, N.Y. — Network Analysis Corp. (NAC) has announced that the graphics features of its two major data network design and analysis software tools can be accessed through Tektronix, Inc. graphics terminals.

The company has previously offered Graphical Interactive Network Designer (Grinder) and Modular Interactive Network Designer (Mind) for use on Imlac Corp. terminals and is now making them accessible on the lower cost Tektronix equipment.

Grinder and Mind enable the user to

simulate network performance under varying operating parameters and allow them to automatically design a least-cost layout that satisfies the selected performance characteristics of the simulation, NAC said.

The graphics features of the NAC software produce the results of the simulations in the form of curves and histograms, and line layouts can be viewed as actual network maps displayed on the terminal's CRT, according to the vendor.

Mind is offered for an annual fee of \$10,000, while the price of Grinder depends on the application, a spokesman said from 130 Steamboat Road, Great Neck, N.Y. 11024.

Teletype 4540 Supports X3.66

SKOKIE, Ill. — Teletype Corp. has enhanced its 4540 data terminal series to support the bit-oriented protocol defined by the Unbalanced Normal Response Mode of the Advanced Data Communications Control Procedure (Ansi Standard X3.66-1979).

The protocol is reportedly understood to be equivalent to IBM's synchronous Data Link Control. The series also supports character-oriented IBM 3270 binary synchronous protocol, Teletype said.

Within the circular base of each 13-in., 80-char. by 24-line CRT, Teletype placed circular cards with a microprocessor-based display controller having 16K bytes of random-access memory. Each display's controller program is loaded from the cluster controller.

The cluster controller accommodates from eight to 32 devices; as many as eight devices can be printers.

The cost of a typical system — including seven 4540 CRT terminals and one 300 line/min printer — is \$23,825 from Teletype at 5555 Touhy Ave., Skokie, Ill. 60076.

POS Terminal Holds 46K Bytes

HUNT VALLEY, Md. — General Instrument Corp. has announced a 16-position alphanumeric display point-of-sale (POS) terminal that features 40 back-lighted prompt-function keys to speed sales transactions.

The Model 435's 14K-byte main memory can be expanded to 46K bytes. It employs a master microprocessor for system control and a discrete microcomputer to handle I/O peripherals and communications functions. To add peripherals, the user can interface additional discrete microcomputers and/or discrete controllers to the common data bus.

The 435 can be programmed with multiple applications programs that allow the terminal characteristics to be modified to fit the POS application. The keyboard is buffered.

A pair of 100 char./sec printers can print journal tapes and sales receipts at the same time.

The 435 is compatible with the firm's Model 430 POS terminals and costs \$4,125 from GI's Business Systems Division, 271 Schilling Circle, Hunt Valley, Md. 21031.

Microdata System Provides Link With Large Hosts

IRVINE, Calif. — An intelligent terminal that provides direct communications with large host computer systems is available as part of Microdata Corp.'s Reality C6557 communications system.

Incorporating the vendor's 5750 terminal, the C6557 system can act either as a front-end processor or as a standard data entry terminal and is equipped with software and firmware to emulate IBM 2770, 2780, 3741, 3780 and Hasp workstations.

Present Microdata Reality users need add only the 5750 terminal to their configuration to form a C6557. The system reportedly en-

hances Reality-to-Reality communications with data compression and extended buffer sizes.

The basic C6557 is said to include 64K bytes of main memory; 50M bytes of disk storage; an 800 bit/in. 9-track tape drive; a 150 line/min printer; Microdata's Prism asynchronous CRT terminal and the 5750 terminal.

Options allow main memory expansion to 128K bytes, disk storage expansion to 500M bytes, increase of tape speed to 1,600 bit/in. and increase of printer speed to 600 line/min.

Microdata is at 17481 Red Hill Ave., Irvine, Calif. 92714.

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Involves 64 Food, Discount Stores Bank's Net Keyed on Customer-Operated Units

Special to CW
LOUISVILLE, Ky. — This city, known for fast horses and the fast fists of native son Muhammed Ali, is also the seat of a fast banking network of automated teller machines (ATM) that run around the clock.

With Citizens Fidelity Bank and

Trust's network, some 200,000 bank customers can transact financial business at any of 128 locations throughout Kentucky's Jefferson County.

Besides maintaining 50 full-service branch offices, Citizens provides banking services via customer-operated terminals (COT) in 59 Con-

venient Food Marts and five Consolidated Sales Discount stores in the Louisville area.

Fourteen ATMs are operational 24 hours daily at branch locations and remote shopping areas. Customers run the ATMs and COTs themselves to make checking or savings account deposits or withdrawals or to obtain Visa cash advances or account balance information.

Pilot POS Project

The bank initiated a six-month pilot project in 1976 to study the feasibility of point-of-sale (POS) terminals and determine the most profitable marketplace.

Merchant-operated terminals were chosen for the study. They proved popular with customers, but too much merchant time was required to handle customer transactions. Because of delays in checkout lines, merchant acceptance rapidly declined.

The results of the study showed that while merchant-operated terminals were not feasible, the POS service concept appealed to customers, especially those in small grocery outlets and discount stores. These stores typically handle many check and credit card transactions.

Citizens envisioned a profitable venture with customer-operated terminals and felt confident merchants would support this approach. Offering an additional service with customer appeal would generate more traffic through their stores — and greater sales volume.

Citizens was interested in cooperative merchants with a geographic penetration in the Louisville area. The bank selected IBM 3608 POS terminals, designed as customer-operated devices, on the basis of ease of use and versatility.

Citizens made a presentation to Convenient Industries of America, which endorsed the new project utilizing COTs. Since each Convenient Food Mart is individually owned and operated, the new plan was presented to each merchant.

Fifty-nine Convenient merchants, many of whom had participated in the pilot project, signed up for the service, in addition to five Consolidated Sales discount stores.

Network Makeup

In June 1977, the system became operational. Sixty-four COTs provided a banking service in Convenient and Consolidated stores, a service never before offered at a location other than a branch bank.

Citizens also installed, at other locations, 10 ATMs — IBM 3614 Consumer Transaction Facilities — six in high-volume branch locations, three in shopping centers and one in a grocery store.

"The ATMs offered [Citizens] an opportunity to provide additional banking services at a cost of less than 10% of opening a regular bank branch," according to senior vice-president Frank Knego. Citizens had expanded its branch network overnight from 50 to 124 centers.

The COTs and ATMs handle the same types of transactions, with the exception of bill payments, which only ATMs handle now.

The method of operation is simple on a COT. The customer inserts his plastic card, which is dual-branded with his Citizens debit relationship on one side and his Visa account number on the other, into the magnetic stripe reader on the terminal. He keys in his personal identification number (PIN) and then keys in the appropriate transaction type and the amount.

Next, the customer places a form in the terminal and instructs the terminal to print the document.

The computer generates a transaction number and sequence number for control purposes and prints it on the document. On a deposit, the computer debits the merchant account and credits the customer account. With a withdrawal, the customer account is debited and the merchant account credited.

The customer takes the printed document to the checkout clerk in Convenient stores or the customer courtesy counter in Consolidated stores to complete the transaction.

If the transaction is a deposit, the customer presents the cash and/or properly endorsed checks along with the document. If it is a withdrawal, the customer receives cash and both the customer and merchant sign the document.

Convincing Customers

"In the early stages, the system produced fair results," Knego recalled. "ATMs caught on rapidly because other local banks had been advertising them for more than four years. COTs were something new, and although some consumers readily recognized the convenience of electronic banking, others needed to be convinced."

Citizens' solution to this problem? "We shortened branch hours," Knego explained, "and the usage of both ATMs and COTs increased."

"We can trace movement of volume from the tellers to the terminals," Fred Gronbacher, data services senior vice-president, said. "Tellers should have more time to sell bank products and service customers."


"Hours have been reduced in some branches where alternatives are available, the alternatives being either an ATM or COT. This represents a cost savings, and in some branches, tellers no longer need to work odd hours."

Terminal activity is greater than anticipated for this stage of the project. ATM use far exceeds the national average, and some COTs have shown strong indications of equalling ATM activity, Citizens' officials reported.

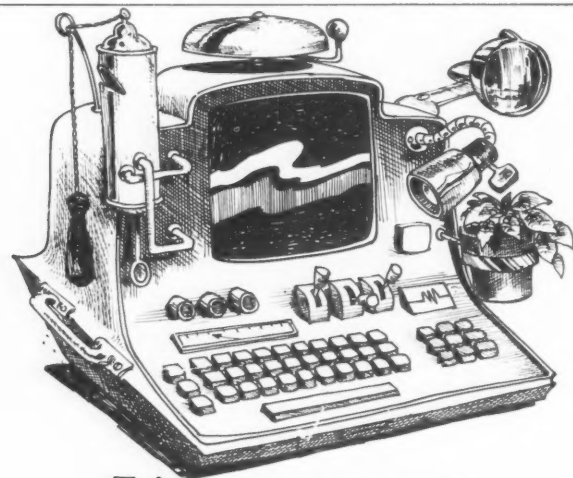
According to Gronbacher, "More than 5% of all retail demand deposit transactions are generated electronically. There has been a reduction in the return of receipts to the customer in 21% of the transactions that occur."

"And, as previously mentioned, the reduction in branch hours has affected operational costs. The system is not yet producing a profit; however, it may pay off sooner than we expect."

"At this point the COT system is beneficial to our stores," Bob Johnson, executive vice-president of Convenient Industries of America, added. "We provide an additional service that our customers want and cannot get elsewhere."



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Supermini Fuels Synthetic Gas Research

By Howard A. Karten

CW Staff

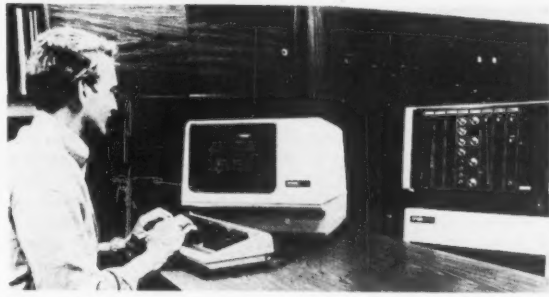
IRVINE, Calif. — Researchers and engineers at Thagard Research, Inc. here are preparing for a five-day test run that will produce Syngas, a synthetic fuel derived from coal. The data looks promising for the gas, and the researchers have been helped significantly by a Digital Equipment Corp. Vax-11/780 "Supermini."

The 2M-byte system, along with two other DEC systems, is attached to a furnace-like device called a high-temperature thermal reactor, located at the company's

South Gate, Calif., facility. According to C.W. Service, a research analyst with the Thagard Oil Subsidiary, a good deal of chemistry research and analysis is conducted at temperatures from 800°F to 1,000°F.

Work in progress here, however, is sometimes conducted at temperatures as high as 4,500°F. "Some unique results occur at those temperatures," he noted.

As a result of the higher temperatures, reactions occur at a faster rate. To investigate precisely what happens, at what point in time it happens and the effect of the different vari-



Thagard Oil is using computers to help develop synthetic gas from coal.

ables requires a computer for the analysis and display of data.

The research, which also involves shale oil processing and
(Continued on Page 64)

S Series Includes 12 Models

Cray Supercomputer Line Gets High End

By Tom Henkel

CW Staff

MINNEAPOLIS — A high-end addition to the Cray-1 line of supercomputers manufactured by Cray Research, Inc. was announced here.

Called the S series, the 12-model line offers 256K to 4M words of main memory. Models with at least 1M word of main memory can accommodate up to four I/O processors; the smaller models can accommodate only one.

Software-compatible with existing Cray-1 processors, the S series offers an improved

I/O processor that acts as a disk controller and a communications link to a front-end computer, which Cray said can be any large CPU.

Another major departure from the Cray-1 is the S series' ability to be expanded to 2M or 4M words of main memory, a spokesman said.

The 64-bit, 12.5 nsec cycle machine in the S series can accommodate up to 48 600M-byte disk drives, supplied to Cray by Control Data Corp. Each system has 16 IBM-compatible channels; the communications

link between the main processor and the I/O processor operates at 850M bit/sec, the vendor said.

Like the Cray-1, the S series employs a pipeline architecture with scalar and vector processing capabilities. It uses a four-chip semiconductor technology, with three additional chips in the I/O processor.

Each S series model uses Cray's COS operating system and comes with an assembler and Fortran compiler.

The members of the S series are the 256K-word Model 250, the 512K-word Model 500 and the 1M-word Model 1000, each of which has one I/O processor; the 1M-word Model 1200 with two I/O processors; the 1M-word Model 1300 with three I/O processors; the 1M-word 1400 with four I/O processors; the Model 2200 which offers 2M words and two I/O processors; the Model 2300, 2M words and three I/O processors; the Model 2400, 2M words and four I/O processors; the 4M-word Model 4200 with two I/O processors; the 4M-word Model 4300 with three I/O processors; and the Model 4400, 4M words and four I/O processors.

The 1200 and larger models include the improved I/O system.

(Continued on Page 64)

Ever Wonder How a Car Maker Would Find You for a Recall?

By Marguerite Zientara

CW Staff

DETROIT — If you've ever wondered how auto manufacturers track down current owners of possibly defective cars for recall, the answer lies in the computer operations of a single company located here.

Founded in 1870, R.L. Polk & Co. started gathering registration data on all makes of cars back in 1922, when it obviously was gathered by hand. Gathered by hand it is no longer, however; Polk gets its information recorded on magnetic tape or microfilm from every state in the union.

Comprising just one of its many statistical services — not all of which hinge on the automotive industry — a Safety Recall File is maintained by Polk for every major motor vehicle manufacturer on a contractual basis, according to John O'Hara, chief legal counsel for the firm.

Polk, which presently employs about 5,000 people, had "a lot more people" before it computerized in the late 1950s. The recall program, however, began only in 1966, by which time the firm had the necessary computing power, O'Hara said.

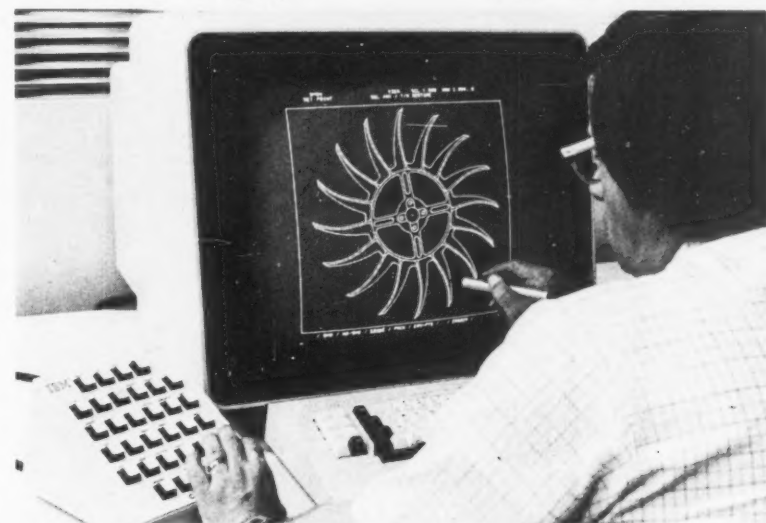
The company bases its DP activities on an IBM 370/168 here with 6M bytes of main memory and 2.5G bytes of disk storage, an IBM 370/158 with an attached processor and 4M bytes of memory and an IBM 3031 with 4M bytes of memory.

There are 5.3 G bytes of tape storage between the 158 and the 3031 — both located in Cincinnati, Ohio — which use 21 Storage Technology Corp. 6,250 bit/in. tape drives.

Federal statute dictates that manufacturers must use state motor vehicle registration records to identify the present owner of a

vehicle in a recall campaign. Original sales records are quickly outdated by subsequent sales of vehicles, expiration of warranties or an owner's change of address, O'Hara explained.

By going to a state's Department of Motor Vehicles, Department of Revenue, Department of Transportation, Department of Highway Safety or Secretary of State, de-
(Continued on Page 62)



No, It's Not 'Star Trek' Again

It's how engineers at International Harvester analyze the design of new equipment. Story on Page 63.

Switch to In-House System Saves \$1,000/Mo

Special to CW
EL SEGUNDO, Calif. — A manufacturer of environmental filtration equipment here cut its DP costs by \$1,000/mo after switching from an outside service to an in-house system, according to company officials.

Farr Co., with sales of \$50 million a year, designs, develops, manufactures, sells and services a variety of filtration systems to control contaminants in air, gases and liquids. Its products are used in heating, ventilating and air-conditioning systems, heavy-duty diesel trucks, locomotives, mining equipment and other areas.

"For years, we were an engineering-based organization that custom-built filtration systems to solve specific problems. In the early 1970s, we recognized that continued growth could be more easily achieved if we emphasized the development of standard products," C.A. Tourville, controller of the company, stated.

"That means we needed more timely management information; overnight batch processing would no longer work for us."

The company had been getting its DP services from an outside company. Although Farr owned the software, the service it was buying was something between a standard facilities management set-up and service bureau, he said. "They were selling excess capacity."

The vendor provided the full spectrum of services — machine time, tapes, forms and personnel — but

Tourville felt the arrangement tended to exert an undesirable influence on the firm's long-range comprehensive planning. For example, the vendor bought software packages for its own specifications, because it serviced other customers as well.

"Not only were we vulnerable to contract cancellation, but we soon realized that if we wanted to run programs or perhaps add software that wasn't compatible with their hardware, we simply couldn't do it. We had to constantly ask ourselves, 'Do they have this? Can they support it?'" he recalled.

Lack of Control

Although he was pleased with the IBM 370/15-based service, Tourville felt he wasn't in control of his own

destiny. "We had reached the crucial point where we needed to begin moving toward very responsive, on-line data base systems in our own environment."

He wanted to switch to such a system in 1976, Tourville recalled, but the economics of the changeover were not right. A year later, the cost of the outside services had risen and the cost of in-house hardware had dropped to the point where a favorable purchasing climate existed.

Even then, however, the ever increasing cost of DP personnel — which now comprises 60% of Farr's DP budget — made it important for the company to upgrade its computing capabilities and bring them in-house without spending any more money.

Language Compatibility

Virtually all Farr's programs were written in Cobol; language compatibility was important. Tourville evaluated proposals submitted by Digital Equipment Corp., Data General Corp., Prime Computer, Inc. and IBM before choosing the Hewlett-Packard Co. HP 3000 Series II he eventually acquired. "The IBM system would have been compatible, but it was a lot more costly" than the alternatives, he noted.

The HP 3000 Series II Farr bought had 512K bytes of memory, two 600 line/min printers, 50M-byte HP drive, four 250M-byte Telefile Corp. disk drives, three 1,600 bit/in. HP tape drives and "about a dozen" HP terminals. The CPU has since been upgraded to a 2M-byte Series III processor.

Conversion of programs from the IBM system to the HP system was easy and cost-effective, Tourville claimed. "It took a 10th of the time it would have to reprogram, thus drastically reducing the conversion cost."

"For example, we totally converted, tested and essentially validated entire systems for payroll and accounts receivable in less than two weeks each," Tourville said.

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While Avoiding \$140,000 Expenditure Thanks to Monitor, User Cuts Response Time

By Hugh Hoffman

Special to CW

MILWAUKEE — Northwestern Mutual Life Insurance Co. substantially reduced response time on one of our on-line systems by analyzing our mainframe disk operations with a hardware monitor. At the same time, we avoided spending \$140,000.

Our home office here houses an IBM 370/168 and a 3033, running under MVS/JES3. The 8M-byte Model 168 and the 6M-byte 3033 share disks, but are not otherwise linked.

The 168 has four block multiplexer channels and the 3033 has six; they share five disk control units and 48 drives. We run an on-line production system on the 168 during first shift; the 3033 runs TSO and batch.

Linked to these systems are terminals at 100 general agencies that generate more than 100,000 transactions daily, as well as 200 Texas Instruments, Inc. terminals in the home office. Both mainframes do production jobs as well as test batch jobs at night.

Contention Problem

Until a few months ago, the TSO and batch activity on the first shift dominated the disk subsystem, causing contention for the on-line system.

To find out exactly what the problem was, we attached a Tesdata Systems Corp. MS 88 III hardware monitor to the mainframes to collect statistics. We made six measurements: channel busy; control unit busy; string busy; drive seek or select or rotational position sensing (RPS) busy; RPS hits and misses; and seek distribution.

Analyzing the data, we made two mathematical assumptions: I/Os are evenly distributed throughout the measured time interval, and I/Os are independent of each other. We also permitted three deviations from these assumptions — for sorts and dumps (because of command chaining), for partitioned data sets (same reason) and for extreme fluctuations in drive or path activity.

The data from our study indicated we should assign all disk drives to either a test or production drive string. In addition, on our first shift we dedicated two controllers to production strings and three to test strings.

The result was a reduction in the average I/O time for the on-line system from 30 msec to 25 msec. This, plus a few other changes, cut average response time from an average 2.2 sec to 1.7 sec and increased the number of responses completing in less than 6 sec from 90% to 95%.

This figure represents the time from when the input message reaches the host to the time the output message is

received at the terminal or, in some cases, is received at an attached minicomputer. It does not include input transmission time — about .3 sec — or minicomputer processing time when applicable — about 1 sec to 2 sec.

We used a similar approach to ameliorate problems we were having with a Texas Instruments, Inc. 960 minicomputer. Each of our general agencies has a TI 960 sending transactions to the mainframe; five TI 960s in the home office also communicate with the host.

We experienced some performance problems on the home office minis. To solve them, we again used a hardware monitor — in this case, the Tesdata Mi-

crosum unit. We stressed the system by having several operators transmit at the same time.

Armed with the test data, we evaluated several disk configuration alternatives. In particular, we had to determine whether to replace the Diablo Systems, Inc. Model 44 drives with larger, faster — and more expensive — IBM 3330-like drives.

Without the hardware monitor data, we might well have chosen the more expensive solution. Instead, we decided to give each drive its own controller for each system.

This resulted in an outlay of \$35,000 rather than the \$100,000 needed to implement the solution recommended by

TI — four 3330-type disks.

On the IBM system, we avoided spending \$70,000 on an additional IBM 3830 disk control unit. Another benefit — and an important one for us — was the education we got.

In particular, studying the shared DASD of the mainframes led us to develop several theories and formulas regarding DASD configuration analysis. We are sharing this data and these ideas with other performance evaluation analysts in the Midwest Computer Measurement Group and the Tesdata Users Group.

Hoffman is a senior systems analyst in the DP department of Northwestern Mutual Life Insurance Co.



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Firm Keeps Car Owners on File for Recall

(Continued from Page 57) pending on state government structure, Polk can buy the information that forms the basis of its business. "Some states sell it at cost, some to make a profit and some on a bid basis," O'Hara said, "so it's all over the lot as far as prices go."

Because Polk also compiles sales figures and analyses each month for auto manufacturers as well as the auto "after-

market" (including vendors of such items as tires, shock absorbers or glass), it needs current information on new vehicle production and sales. Every six months or a year, therefore, the firm generates a new Master File by combining all the records it has collected until then.

The information Polk maintains includes all the information on auto registration forms except line information or

other data irrelevant to its purposes, O'Hara said.

Tracking Down Vehicles

Tracking vehicles for a manufacturer is based on vehicle identification numbers (VIN), which can be separated into blocks or groups. While the manufacturer may recall every vehicle within a certain model or series, at times a recall can be narrowed down to cars made in a single factory or

during a specific time period.

In that case, the manufacturer could ask for VINs ranging from 1,001 to 2,000, for example, of a certain model. "Then, using our file, we identify all those models and the names and addresses of the owners as shown by registration or title records," O'Hara said.

After the owners have been identified, either the manufacturer or Polk mail the recall

notices, since direct mail advertising is another of the firm's activities.

The manufacturer "will need a copy of [the names and addresses] for follow-up purposes, in any event, to maintain compliance reporting to the federal government," O'Hara said. When Polk sells a list for the purpose of mailing recall notices, the manufacturer is bound to use it for that purpose only, he pointed out.

Polk also maintains isolated files for each of the major manufacturers. It can access those files by the owner's name or model or make of the car.

Volume-Sensitive Fees

Auto manufacturers pay a standard rate for Polk's maintenance of a file, based on the number of vehicles they have in operation. "In other words, General Motors pays the most because it has the most vehicles on the road," O'Hara explained.

In the case of a recall, the manufacturer also pays a service charge that is based on the number of vehicles accessed. "We guarantee a 10-day turnaround time from the request to delivering the information," O'Hara noted.

When the recall program started in 1966, manufacturers were required only to mail notices to the first owner of a vehicle. It wasn't until 1974 that they had to base notices on current motor vehicle registration information.

Polk claims to be the only company that can provide the all-encompassing motor vehicle statistics that it does. "A manufacturer could go state-to-state... on its own, but that's a hard job because each state has its own formats and procedures," O'Hara observed.

Besides the mainframes in Cincinnati, there are four IBM 1403 printers operating at 1,100 line/min and a Decision Data Computer Corp. 1,500 line/min printer.

Back in Taylor, Mich., with the 370/168 are 17 Documentation, Inc. printers, including 12 operating at 1,800 line/min, four operating at 2,250 line/min and one at 3,000 line/min, and four IBM 3800 laser printers operating at speeds up to 450 line/sec.

Real productivity is a function of time and performance controls. The Panasonic Data Entry Terminal helps by providing simplified, immediate, error-free transmission of data by any worker, at any station, directly to the computer.

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What's more, the Terminals are designed to interface with most data processing equipment, both on-line and off-line. Frequently they will be compatible with equipment presently in use.

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Also Increases Drawings' Accuracy Graphics System Boosts Designers' Output

Special to CW

HINSDALE, Ill. — A computer graphics system here is helping a user increase its engineers' productivity and allow them to perform more detailed analyses of the equipment they design.

The system, installed in May 1978 at International Harvester's (IH) Agricultural Equipment Engineering Center, is also greatly improving the accuracy of drawings the engineers produce, according to Dick Steingas, industrial engineering coordinator for IH. "It's helping us meet today's schedules and increases the likelihood that innovative products reach the customer more quickly in the future," he commented.

The Engineering Center is responsible for the design and development of agricultural equipment. Engineers produce the initial drawings which are used to make product prototypes. Each prototype is modified as a result of engineering tests until it is suitable for mass production.

Opening a Bottleneck

Although producing a working drawing is an important part of the design engineer's job, it is also a bottleneck for the design department. IH management decided to evaluate computer graphics in late 1976 to see if it could eliminate that bottleneck problem.

A committee of research and engineering personnel evaluated two competing systems and eventually selected the Computer-Augmented Design and Manufacturing (Cadam) system developed by Lockheed Corp. and licensed through IBM. IH currently has more than 3,000 drawings filed on its IBM 370/138.

"Our two major concerns prior to selecting the system were 'Can it do our work?' and 'Can it be handled by our people?' Steingas recalled. After giving the system a short-term trial Steingas felt he had his answer and decided to keep it.

Originally installed with four IBM 3251 graphics CRT stations, the system has since been upgraded to the point where it now includes the 1M-byte CPU, eight more 3251s, four IBM 3340 disk drives, two tape drives, a printer and card reader and four IBM 3255 CRT controllers.

Hard-copy output equipment includes a Versatec 8242 electrostatic plotter, an Information International, Inc. Comp-80 computer output microfilm (COM) unit and an off-line, automated drafting system.

Imaginary Drawing Board

The system gives designers an imaginary 20,000- by 20,000-in. drawing board. Any portion of the imaginary drawing board can be viewed through the CRT; the engineer can create multiple features of the display by drawing a feature once and locating it anywhere within the drawing board space without having to redraw it.

To use the system, the engineer first selects the function mode — for example, a line or a circle — by using a function keyboard attached to the CRT. He used a light pen and an alphanumeric keyboard to perform the various drafting, design and analysis functions.

For example, the keyboard is used to

attach labels, dimensions or explanations, while the light pen is used for making changes in the drawing itself.

When the drawing is ready to be produced in hard-copy form, the electrostatic plotter, with a resolution of 200 dot/in., is used. When the prototype goes into production, the data is transferred to the COM unit, which produces a high-resolution, 35mm copy of it.

"Accuracy of the drawings is greatly improved with this system," Steingas said. "We eliminate the problem of layout paper shrinking and stretching, encountered with conventional drawing methods."

The increased accuracy results in

drawings that provide better component fits when the product is actually assembled. "We can assemble parts electronically by calling up the individual components and laying one drawing over another on the screen. Then we can zoom in on the critical areas and visually check for clearance or interference between the parts," Steingas noted.

The company did studies to compare the time required to produce drawings on conventional boards against the time required with the computer system and found some dramatic productivity gains, Steingas claimed. "For some parts that have several repetitive features, such as a rotary hoe wheel,

the computer method is 15 times faster. On drawings with no repetitive features and fairly simple design, the ratio may be as low as 2:1, but that's still significant."

Quick Analysis

Analyzing what's been done quickly is another benefit of the system. "We can call up any drawing and quickly check the properties of any section of the piece, including the area and highly technical engineering properties," Steingas said. "Consequently, we are analyzing more designs than we ever did before and performing more analyses on parts."

(Continued on Page 64)

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Graphics System Increases Design Engineers' Output

(Continued from Page 63)

Moreover, estimating the cost of a particular part has become easier, Steingas said. "We call up the part [on the system], run a weight analysis, calculate the cost of the materials, and we have our estimate."

Fringe Benefits

Since its function is primarily to produce graphics, the Cadam system is clearly not limited to engineering applications. For example, it could be used for designing the layout of office areas.

"That's one of the fringe benefits we didn't consider when selecting the equipment, but it's a worthwhile feature to have," Steingas commented.

Although some employees were apprehensive when the system was first installed, that has changed, Steingas said. Instead, "people in the department are eager to get time on the system."

To date, 26 employees are considered qualified users. IH eventually hopes to have every designer qualified to use the equipment, which is available 24 hours a day.

"The best thing about the system is that it's not necessary to relearn drafting techniques," Steingas said. "Designing on the system is by descriptive geometry and conventional drafting methods—it's just a matter of learning to interact with the computer."

Studies IH has done show it takes about 480 hours of use before an engineer reaches peak efficiency with the system, but it takes only 80 hours before he reaches the point where he is as efficient as if he were using conventional drafting techniques, Steingas said.

Company plans call for some future expansion of the system, but exactly how and what kind are still being reviewed, Steingas concluded.

Energy Research Aided

(Continued from Page 57)

the conversion of municipal sewage and wastes into synthetic gas, has been going on since 1971, Service said. The VAX system, which can collect data at the rate of 1,400 samples per minute, has helped the company accelerate its research. A Hewlett-Packard Co. HP-9815 in use before the present system was only able to collect 10 sets of sample data per minute, Service said.

The VAX-11/780 is front-ended by a DEC PDP-11/60. That system, with 128K bytes of memory, performs all the telecommunications required to communicate with the test site. It also "compresses" the data it transmits so the VAX can process data in real-time.

The PDP system, in turn, is connected to a DEC Modular Instrumentation Computer, essentially an analog-to-digital converter that monitors the physical processes and signals from the reactor.

"It's really uneconomical to have the VAX doing the communications; the

front end reduces the I/O overhead on the VAX," Service commented.

Another significant piece of computer gear at Thagard is a California Computer Products, Inc. 1055 plotter. "We use it for trend analysis, so we can do quick visual analyses of the data" and spot hitherto undetected data, Service said.

The thermal reactor takes in coal slurry—finely ground coal—and subjects it to extremely high heat. The output of this process is a mixture of carbon dioxide, carbon monoxide and hydrogen that is said to have one-third the calorific value of natural gas. Despite the amount of energy required for the reactor vessel, the net energy output is still positive, Service indicated.

The VAX system is not limited to research applications, the research analyst noted. It is used for all the firm's accounting functions, as well as the layout of circuit boards for research projects.

Cray-1 Gets High End

(Continued from Page 57)

Front-end interfaces are available for CDC Cyber 70 and 170 mainframes; the IBM 370 line; Amdahl Corp. 470V/7 CPUs; Honeywell, Inc. Level 66 CPUs; the Digital Equipment Corp. Decsystem-10 and Decsystem-20; Data General Corp. Eclipse and M600 CPUs; and System Engineering Laboratories, Inc. processors.

Cray is willing to build interfaces for Univac or any other front-end large enough to accommodate the S series, a spokesman noted.

Delivery of the first S series CPU is scheduled for the fourth quarter of 1980. The spokesman said nine S series CPUs will be made during 1980.

Approximate Prices

Cray has not determined exact prices for the processors. According to the spokesman, however, the 250 will cost about \$4.8 million; the 500, \$4.8 million; the 1000, \$8.3 million; the 1200, 1300 and 1400, \$9 million; the 2200,

2300 and 2400, \$11 million; the 4200 and 4300, \$15 million; and the 4400, about \$15.5 million.

Going for the S

Since it was designed principally for large research and statistical applications, more commercial institutions will go for the S series, the spokesman said. Cray-1 users can also install the S series processor as a tandem CPU to the existing system, thus doubling their computing power, he noted.

"We'll be finding these computers in the future in a number of commercial applications that range from structural design to the automobile industry. They will be used for designing bridges or for any other kind of structural package," the spokesman said.

The spokesman pointed out that the S series announcement was in addition to the promised Cray-2 processor, still under development. No word was available on when that CPU will be released.

Rated High in Federal Report

Mini Helps Court Speed Judicial Process

Special to CW
ANNAPOLIS, Md. — With courts becoming increasingly bogged down by the sheer volume of cases, a national trend is under way to speed the judicial process.

Although computerization may seem like the natural solution to this problem, only

about 200 computer-based court management systems are currently operating around the country — most of them using large-scale mainframes.

Motivated by increasing public pressure for speedy trials, however, court administrators are slowly discovering the minicomputer.

Slow in Coming

"The majority of the courts are steeped in tradition and are reluctant to impose any kind of change," according to Joseph Foster, criminal department supervisor of the Circuit Court for Anne Arundel County here. "That's been one of the major reasons computerization has been slow in coming."

The high cost of court computerization, particularly when mainframes are involved, is another reason why justice has turned its back on court automation, Foster observed.

With a work load expanding at a rate of 30% to 40% per year, Anne Arundel's Circuit Court acquired a minicomputer-based court system that handles all of the judicial tasks that were originally performed manually.

The installed system was cited earlier this year in a federal report produced by the Mitre Corp. for the Law Enforcement Assis-



Specialist in Anne Arundel County State's Attorney Office enters witness data at Northern Telecom Model 440 terminal.

tance Administration (LEAA). According to the report, the average developmental cost of court systems investigated by Mitre ranged from \$500,000 to \$4 million, with annual operating expenses varying from \$100,000 to about \$1 million.

However, Anne Arundel's total two-year costs were about \$160,000.

The heart of the system is the hardware, (Continued on Page 66)

Datapoint Offers 6600 Memory

SAN ANTONIO, Texas — Datapoint Corp. has unveiled a number of memory enhancements for its 6600 series Advanced Business Processor (ABP) and its 6000 series attached processors (AP) that more than double the user memory in each machine.

The Model 0507 memory replacement kit offers 256K bytes of memory and upgrades user memory space from 120K to 248K bytes for both the 6600 and the 6000 mainframes. The memory addition does not affect either machine's memory space handling capabilities or memory speeds, a spokesman stated.

With the expanded memory, the 6600 can reportedly handle up to 24 CRT terminals, executing the same or different programs concurrently. The expanded 6000 AP has the same internal structure as the 6600.

The memory enhancement costs \$3,200 and can also be purchased or leased as part of a new Datapoint system, the spokesman explained from 9725 Datapoint Drive, San Antonio, Texas 78284.

DEC VAX-11/780 Gets Tape Drives

WOBURN, Mass. — Introduced by Aviv Corp. and designed for use with the Digital Equipment Corp. VAX-11/780 minicomputer, the Model TFS-812 and 804 group recording unit (GCR) tape drives both operate on a Unibus adapter and have software drives compatible with the VMS system.

The TFS-812 is an 800- to 1,600 bit/in. system that consists of a controller, an industry-standard transport and connecting cables. Up to eight of these drives can be daisy-chained off the same controller, and system throughput requirements can be matched by providing tape transports at 45-, 75-, or 125 in./sec, a spokesman said.

The Model 804 GCR can record at either 1,600- or 6,250 bit/in. and was designed to read and write data in IBM and DEC packing formats. The dual-density 9-track system provides storage in excess of 150M bytes on a 2,400-ft tape reel and has a data transfer rate of 470K byte/sec — nearly four times the rate of a conventional 1,600 bit/in. system, the spokesman claimed.

The unit consists of a Storage Technology Corp. microsequencer controller tape drive and formatter and a hex-size controller adapter that employs bit-slice technology. The controller adapter fits into the peripheral controller slot in the host computer and incorporates 4K bytes of storage, the spokesman continued.

Prices for the TFS-812 begin at \$8,250, while the 804 costs \$28,200. OEM discounts are available for the latter system, as is an optional cabinet priced at \$1,200.

Aviv is located at 6 Cummings Park, Woburn, Mass. 01801.

Archives Small Business System Includes 77-Track Disk Drives

DAVENPORT, Iowa — Archives, Inc. has announced a microcomputer-based small business system that has 64K bytes of random-access memory (RAM), dual 77-track disk drives and a CRT monitor.

Slated to be unveiled this December at the Comdex '79 third-party vendor show in Las Vegas, the system incorporates a Z80A microprocessor and can store up to 744K bytes of data in its two built-in disk drives. The unit's green phosphor CRT can handle 25 lines of 80 char., a spokesman said.

Screen features include inverse video, blink and underline in any of eight different intensities.

The system's detachable keyboard has

both function and numeric key clusters as well as 23 relegendable function keys. Both serial and parallel I/O ports are standard, as is a real-time clock with battery backup, the spokesman noted.

Circuit-breaker and thermal protection are incorporated into the system, and software includes a 2K monitor and CP/M operating system.

General ledger, accounts receivable and payable, payroll, inventory and word processing software, as well as Microsoft Basic, Fortran and CBasic 2, are optional.

The business computer costs \$6,500 from Archives at 404 W. 35 St., Davenport, Iowa 52806.

CDC Phoenix Drive Forms Base For Disk Storage Subsystem

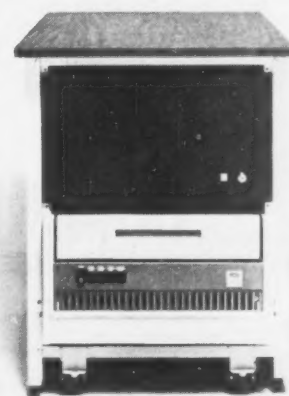
IRVINE, Calif. — Alpha Microsystems, Inc. has announced an S-100 bus-compatible disk subsystem that is based on Control Data Corp.'s Phoenix drive and has a 90M-byte storage capacity.

The AM 410 is tied to a dual-board controller and interconnecting cables and consists of 75M bytes of fixed disk combined with 15M bytes of removable cartridge storage. The controller is interrupt-driven and operates on full 512-type sector data transfers. The unit also has an average access time of 30 msec and incorporates a number of error-checking capabilities, a spokesman stated.

Up to four AM 410s can be connected to one controller for a total storage capacity of 360M bytes of data. Although the device was designed to work with Alpha Micro's Amos operating system, it can be used with other operating systems on either the 8- or 16-bit S-100 bus, he added.

The drive costs \$12,995, while an optional cabinet costs an additional \$500 from the

firm at 17881 Sky Park N., Irvine, Calif. 92714.



The Alpha Microsystems AM 410

MINI-TWO-RTD

Controller Lets Printers Link With PE Processors

ANAHEIM, Calif. — Macrolink, Inc. has introduced a controller that is said to allow line printers using the Centronics Data Computer Corp./Dataproducts Corp./Data Printer Corp. interface — including printers made by Control Data Corp. and Documentation, Inc. — to be linked with Perkin-Elmer Corp. (PE) Interdata processors.

Software Compatible

The controller handles printers with speeds up to 3,700 line/min and plugs directly into the I/O slot of either 16- or 32-bit PE computers. The module is software-compatible with both the OS/16 and OS/32 operating systems and takes advantage of host-supplied

diagnostics capabilities, a spokesman noted.

Pin-compatible Interdata cables are provided, which allow the host-supplied printer interface to be directly replaced by the Macrolink controller, he added. Also, a half-board mounting kit and filler plate is supplied with the controller to ensure the module's installation in any available I/O slot of the host chassis.

Fully burned-in and tested, the controller costs \$650, including all cables, mounting hardware and a user's manual. Further information can be obtained from Macrolink at 1740-E S. Anaheim Blvd., Anaheim, Calif. 92805.

Mini-Based Court System Speeds Judicial Process

(Continued from Page 65)

which consists of a Northern Telecom Systems Corp. Model 440 minicomputer, a 120 char./sec Sprinter printer, a magnetic tape drive, 20M bytes of disk storage and three CRT stations. The system is located directly in the courthouse, and files are updated online as new data is entered, allowing for immediate retrieval, Foster said.

Prior to installing this system, Court officials had to review each case manually to collect data for analysis. "We designed this system to capture data on everything we felt to be relevant, but it is set up so that new elements can be defined, and data collected on them, without modifying the system,"

Foster continued.

Although the bulk of the data is entered by the people in the Clerk's Office, the State's Attorney Office also has a terminal, which is used to enter the names of witnesses and review data on individual cases.

The system presently produces many legal documents such as summonses, writs and notices for the participants in all criminal trials. Commitment records are prepared for those defendants who receive incarceration as a part of their sentence.

The package also generates a daily court schedule of all criminal cases to be heard on a particular day, as well as a future schedule for upcoming court actions.

A variety of reports are produced by the system for various state and local departments. These include an aging report used by the State's Attorney Office to expedite case movement; a report to the State Motor Vehicle Administration showing the disposition of all charges relating to traffic and motor vehicle; and a report to the State Board of Election Supervisors showing all persons convicted of an infamous crime.

Each judge also receives a status report of each of the cases assigned to him, Foster explained.

Less Confusion

A weekly listing of all open and pending cases in the Circuit Court, cross-referencing the District Court case number, has eliminated confusion for the county detention center.

Problems can arise when a defendant is arrested and initially processed by the District Court, then jurisdiction is transferred to the Circuit Court, Foster stated. This weekly report includes the date of the defendant's next scheduled court appearance, thereby eliminating unnecessary postponements because a defendant was transferred to another institution just prior to his scheduled trial date.

The system's software was developed by David Currier of TCB Corp. here, who points out that many existing computerized court systems are largely statistical data bases and not geared toward the day-to-day work of the people in the courts.

"This system was designed with the support people in mind — what do they do [and] how do they do it," Currier noted.

Few Alterations

All of the documents used in the manual system have been adapted to the new system, with little alteration in format, which results in a minimum of training time for office personnel. "Therefore, no one had to be trained in our daily routines," Foster commented.

In addition, court scheduling decisions are now triggered from computer-prepared reports so people can not only save time, but can also make practical management decisions to aid case flows, he said.

Since the system can handle about 10,000 cases per year, administrators are thinking of expanding it to include the Public Defender's Office and juvenile law, possibly covering some out-of-state locations.



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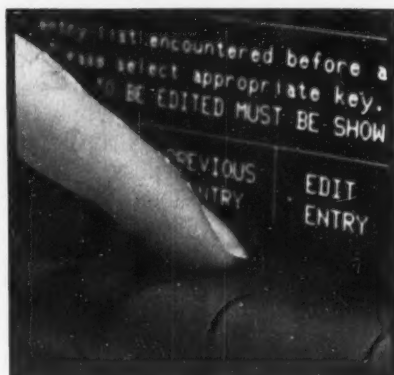
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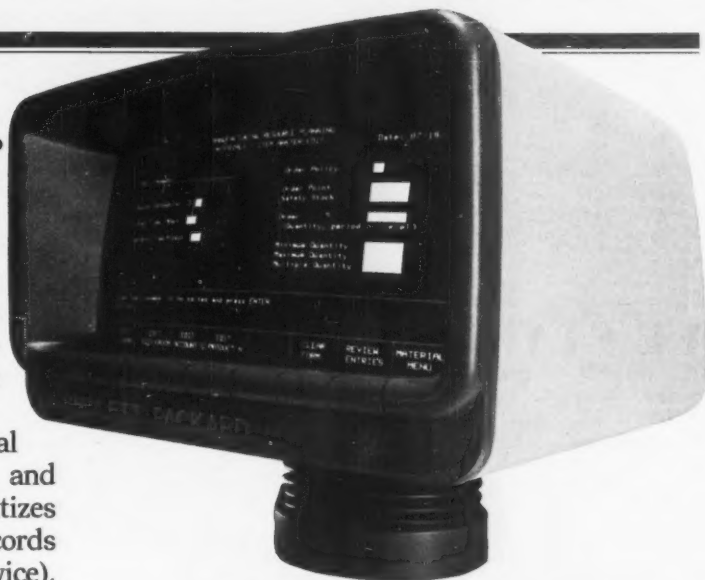
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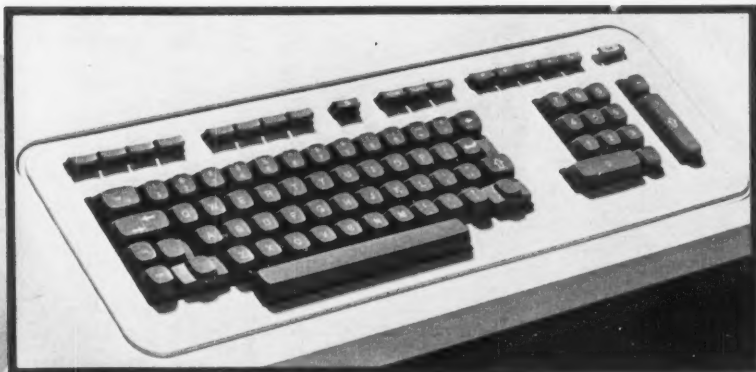


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**HEWLETT
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Cuts Work Load 50 Man-Hour/Mo Small System Trims Hotel's Costs \$1,000/Mo

By Jeffry Beeler

CW West Coast Bureau
ROCK SPRINGS, Wyo. — Accounting costs at a local hotel have dipped by \$1,000/mo, thanks to a small business system that has trimmed the establishment's accounting work load by 50 man-hour/mo.

The system, which is expected to pay for itself in three years, has also reportedly speeded preparation of monthly financial statements and allowed the Outlaw Inn to

spot possible management shortcomings by producing on-the-spot status reports.

In addition to creating profit and loss statements, balance sheets and cost analyses, the system reports the inn's room and restaurant statistics and performs standard accounting functions like general ledger, city ledger, accounts payable and accounts receivable.

The system also prepares the hotel's payroll by calculating each employee's gross pay and taxes and then printing pay-

checks complete with Internal Revenue Service forms and distribution reports.

Pegboard System

Before it acquired the system, the Outlaw Inn performed most of its accounting tasks with a manual pegboard system. Unfortunately for the inn, however, the pegboard forced management to spend 16 to 20 man-hour/mo just hand-posting and extending the 362 accounts maintained by its 10 profit centers.

Additional time and effort were required to manually prepare the hotel's trial balances, profit and loss statements and balance sheets.

To make matters even worse, the pegboard system also hindered production of the inn's end-of-the-month operating statements, often with unpleasant consequences.

"When you are working with information that is 30 days old, the job of trying to control any business efficiently is very frustrating," according to Don Anselmi, the Outlaw Inn's director and general manager.

System Upgrade

To improve the timeliness of its operating statements as well as to streamline its accounting procedures, the hotel decided to replace its pegboard system with an in-house small business computer. The job of configuring the system went to Harris-Kerr-Forster & Co.,

an accounting firm specializing in the lodging industry.

With the help of a local hardware distributor, the accounting firm studied the problems of hotel and motel back-office management and then designed a system to solve those problems.

The system, a Digital Equipment Corp. Datasystem 310, incorporates 32K-byte PDP-8 processor and comes with a set of accounting and reporting programs stored on 670K-byte dual floppy disk units.

Faster Statements

Since the system's installation, the Outlaw Inn has cut the lead time for preparing monthly financial statements to just a few minutes, compared with four or five days with the manual method.

The system can reportedly generate these statements for any specified period and can break them by department or allow them to reflect the organization as a whole.

Moreover, the system can provide year-to-date financial comparisons, occupancy statistics and other monthly reports within an hour after the inn's books close at the end of each month, Anselmi said.

Payroll Application

One of the system's most important applications is payroll, which usually takes only about seven hours to complete, with another five hours required for file maintenance and payroll updates.

To prepare the inn's payroll, an equipment operator enters each employee's identification code, department code, number of hours worked, pay rate and amount of tips into a DEC VT50 Decscope CRT terminal.

The system then computes each employee's gross pay and taxes and generates a paycheck with a 180 char./sec Decwriter printer.

At the same time, the system also produces a payroll attendance register and several other related documents and, when necessary, can provide year-end W-2 forms, and alphabetical employee lists, payroll histories and sick-pay reports.

The inn's payroll program serves both hourly and salaried employees and, when preparing an individual's paycheck, takes into account regular pay, overtime pay and tips. It also provides for five types of payroll deductions.

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Wang's Users Conference To Feature Noted Author

BOSTON — A variety of presentations, workshops and discussions as well as an address delivered by best-selling author Vance Packard will highlight Wang Laboratories, Inc.'s International Users Conference here Dec. 3-6.

Expected to draw DP and word processing managers from around the world, the conference will focus on the firm's recently introduced Integrated Information Systems, the VS-100 minicomputer, a number of office information systems and hardware peripherals, all of which will be demonstrated, a spokesman stated. In addition, company representatives will give instruction on Mailway, Wang's electronic mail system, and will cover some newly developed programming techniques.

Conference plans also include the introduction of a number of products aimed at the small business computer market, the spokesman said.

Packard, author of *The People Shapers*, *The Status*



Vance Packard

Seekers and other well-known works that reflects on the future, will target his keynote speech on the working environments, homes and recreational activities of tomorrow.

The registration fee for the entire conference is \$250. Discount rates, not available at press time, are scheduled to be announced.

Additional information on the conference can be obtained from Wang at 1 Industrial Ave., Lowell, Mass. 01851.

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On October 1, we committed ourselves to the compatible computer industry in an even bigger way. Intel's computer sales, service and support operations became a part of National Semiconductor. And now we call the organization National Advanced Systems.

That's how the number one manufacturer of compatible computers and leader in semiconductor technology joined forces with the world's foremost name in IBM-compatible computer marketing.

It's a case of natural teamwork. National Semiconductor has manufactured more IBM-compatible computers than any other independent company. Intel has installed over 350 systems and over 15,000 peripherals.

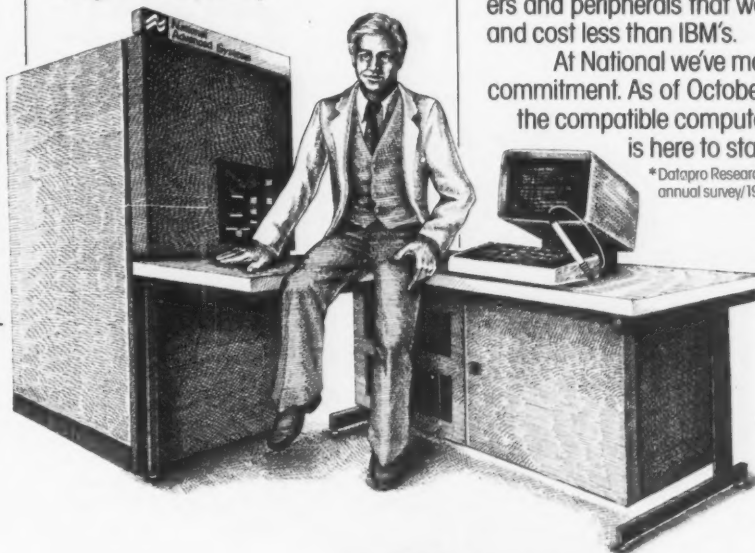
National Advanced Systems will market a complete line of medium-to-large scale IBM-compatible computer products, including current and future systems from National and other computer and peripheral manufacturers.

National will also retain Intel's #1 Datapro-rated* service and support force intact and continue all maintenance and service on the exist-

ing installed base in over 2000 customer locations.

What it means to our customers.

It means that the Advanced Systems product line, the IBM-compatible computers and peripherals that are smaller, cooler, more energy-efficient and less expensive than their IBM counterparts, now have the backing of a billion-dollar technology corporation. Not only is this a commitment to the existence of National Advanced Systems, but because National Semiconductor remains at the forefront of technology, it means our products will continually provide state-of-the-art design and capability.



What it means to our industry.

It is evident that IBM has itself become a compatible computer manufacturer. Since the 360 computer line, IBM has announced the 370 Series, the 3000 Series, and the 4000 Series, each of which offered upward compatibility from their predecessor. You can bet that IBM won't deviate from this course in the future. The fact that the user community has invested close to \$300 billion in software and systems guarantees this.

So, if you take stock in IBM's direction, our position has been reinforced. We feel the industry will continue and thrive as long as we keep delivering compatible computers and peripherals that work better and cost less than IBM's.

At National we've made our commitment. As of October 1, 1979 the compatible computer industry is here to stay.

* Datapro Research Corporation's annual survey/1979.



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Printer Designed for Use With TRS-80 and Others

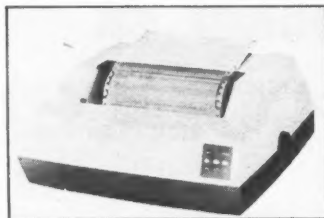
GARDENA, Calif. — Matchless Systems has introduced a bidirectional matrix printer for Radio Shack TRS-80 microcomputer systems as well as other computers using a parallel interface compatible with Centronics Data Computer Corp. equipment.

The tabletop printer has a print speed of 125 char./sec and a throughput print speed of up to 63 line/min, a spokesman said. The unit's adjustable sprocket feed mechanism accepts forms from 4.5- to 9.5 in. wide, and paper can be loaded from either the bottom of the printer or the rear.

A full 96-char. Ascii set can be expanded for double-width fonts in bold

face.

The printer costs \$777, but for a limited time will be selling for \$749 as an introductory offer from Matchless Systems at Department 3, 18444 S. Broadway, Gardena, Calif. 90248.



Matchless Systems Printer

National Semi Introduces Series of Dynamic RAM Boards

SANTA CLARA, Calif. — National Semiconductor Corp. has introduced a series of dynamic random-access memory (RAM) boards that boast high speeds, low power requirements and up to 64K bytes of memory.

The BLC-032, -048 and -064 offer 32K, 48K and 64K bytes of RAM, respectively, and can operate as either 8-bit or 16-bit memories. Basically a part of National Semi's Series/80 microcomputer family, the boards incorporate refresh, timing, control and buffering circuitry, as well as a 20-bit address code that allows their use in 1M-byte memory systems, a spokesman said.

The boards have an access time of 430 nsec and a full read or write cycle

of 660 nsec. As for power requirements, the BLC-064 is said to have a power consumption of about 20.7W, approximately 88% of the 23.4W required by the comparable Intel Corp. SBC-064.

Refresh Logic

In addition, the boards function in either an advanced or delayed write mode and have logic circuitry for battery backup and memory protection, the spokesman continued.

All of the units have an on-board refresh logic that refreshes a portion of the total memory every 13 msec.

The BLC-032, -048 and -064 cost \$1,430, \$1,995 and \$2,310, respectively. National Semi is at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Dysan Offering Diskette Line

SANTA CLARA, Calif. — Dysan Corp. is now offering a complete line of IBM-compatible diskettes for users of IBM's System/32, System/34, Series 1, 5110 and the OS-6 word processing system.

The diskettes are formatted and available in three forms. The 3740/1 is a one-sided, single-density diskette equivalent to IBM's Diskette 1; the 3740/2 is a two-sided, single-density diskette equivalent to IBM's Diskette 2; and the 3740/2D, a two-sided, double density version, is equal to IBM's Diskette 2D.

With color-coded identification labels, the Dysan models 3740/1, -2, and -2D are priced at \$4.25, \$5.25 and \$6.25, respectively. Dysan is at 5440 Patrick Henry Drive, Santa Clara, Calif. 95050.

Report Targets Small Users

VISTA, Calif. — User experiences, technological trends and the nitty-gritty of equipment selection all form a part of a monthly magazine-type report being offered by Canning Publications, Inc.

"Computing In Your Business" is aimed at the small business sector and attempts to present the ins and outs of the computer field in nontechnical jargon, according to a company spokesman. The publication will focus on the benefits and problems of using stand-alone computer systems and will, in fact, discuss the machine as another piece of office equipment rather than an intimidating object.

Monthly features will cover: selecting computer programs, equipment opportunities, training, adding new applications and protecting your computer investment. A special section will be devoted to computing practices, the spokesman continued.

A year's subscription costs \$36, a two-year subscription costs \$66 and a three-year subscription costs \$90. A free copy of "A Layman's Guide: How Computers Work" will also be included with the subscription order.

Canning Publications is located at 925 Anza Ave., Vista, Calif. 92083.

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Because of Steady Mid-Year Kickers PCMs Seen Playing Catch-Up With IBM

By Marcia Blumenthal

CW Staff

COLORADO SPRINGS, Colo. — Users now teetering on the brink of a decision to opt for IBM plug-compatible mainframes will continue to experience that tipsy feeling as IBM regularly enhances its products with "mid-year" rather than mid-life kickers.

"Every six to nine months, IBM will bring out strange and wonderful things that will be available to users immediately," Dr. David Gold, an independent industry consultant, predicted. This ploy will be a major IBM strategy for the early 1980s, embroiling

the plug-compatible manufacturers (PCM) in a constant game of catch-up. The key to survival is the PCMs' ability to keep their hardware "soft," or adaptable to IBM's tinkering, he concluded.

Gold's assessment of IBM's mid-year kicker strategy raises the inevitable question of how PCM vendors will be able to compete with the giant when "IBM changes its products every day." In October 1972, IBM almost put the then-fledgling Amdahl Corp. out of business by announcing the immediate availability of "hardware relocate" for its 370s, he charged.

Gold recently laid out IBM's challenge to the PCMs to a group of executives attending the Association of Data Processing Service Organizations, Inc.'s 51st annual management conference here.

Gold cautioned the PCMs would have especially rough going as IBM continues the software unbundling that may eventually result in users paying 50% of the cost of the system for software. "At that point, the economics of PCM hardware is questionable," he maintained.

Uncertain Prospects

While predicting IBM's activities would create cramps in PCM market prospects, Gold was guarded rather than gloomy about the ultimate fate of PCM vendors.

IBM may turn users off by continuing to seek maximum revenues through an artificial pricing structure instead of reorienting itself to solving users problems. It may also cause dismay by placing artificial configuration constraints on its products — for example, by never providing enough memory, Gold claimed.

In addition, IBM is constrained in ways that may provide an opening for PCMs. "IBM cannot live with smaller margins," Gold observed, adding the firm can not lower prices in hopes of increasing market elasticity. However, he did allow that IBM could continue to squeeze PCM competitors as hardware prices are lowered by new tech-

(Continued on Page 74)

National Semi Gives Nasco Moderate Management Style

By Jeffry Beeler

CW West Coast Bureau

PALO ALTO, Calif. — Intel Corp.'s former Data Products Group has gained not just a new name but a new management style as well in its reincarnation as National Advanced Systems Corp. (Nasco).

The organization that once set the computer industry standard for extravagant growth plans and free wheeling spending now finds itself in a period of unaccustomed austerity.

Under National Semiconductor Corp.'s strict controls, the group has slowed its growth rate from an all out gallop to a more respectable canter. Risky practices like gearing current expansion to future demands have been banned by Nasco President Floyd Kvamme as "against our religion."

The imposition of tight management restraints might have robbed the organization of some of its former exhilaration, but it has minimized the chances that Nasco will follow in the Data Products Group's footsteps to the financial graveyard, Kvamme said recently at National Semiconductor's annual stockholder's meeting here.

Kvamme's remark came in response to questions about how National Semiconductor would differ from Intel in its computer industry business methods.

Stressing Performance

Another difference that will separate the two firms, Kvamme said, will be the way they slant their sales presentations to pro-

spective buyers of Intel's Advanced Systems mainframes. Nasco will stress the machines' supposed performance advantages over their IBM counterparts, while Intel downplayed those assets and instead concentrated on the benefits of its leasing arrangements.

In other comments, Kvamme told stockholders that although the impact of recent U.S. Federal Reserve actions is still uncertain, he foresees no serious problems in obtaining funds to support Intel's former lease base. Among most banks, interest in financing lease transactions still runs high, he

(Continued on Page 77)

Export Control Regulations Signed Into Law

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — President Carter recently signed into law new export control regulations designed to promote international commerce, but DP industry representatives are not very optimistic the new law will greatly facilitate approval of high-technology exports.

The recent Defense Department (DOD) decision to disapprove a Control Data Corp. computer sale to the Soviet Union [CW, Oct. 22] is a prime example of the chronically uneven administration of U.S. export controls of which the DP industry has long

been critical, according to CDC officials. They and other industry representatives had hoped the Export Administration Act of 1979 would remedy such problems.

However, it is not clear that the new guidelines, signed into law Sept. 29 — just two days before Defense Secretary Harold Brown's decision against the CDC Cyber 73 sale — will greatly ease the burden of obtaining export licenses for DP products destined for communist countries.

The new law is only slightly more liberal than the previous export controls. Essentially a compromise bill that softened the

(Continued on Page 78)

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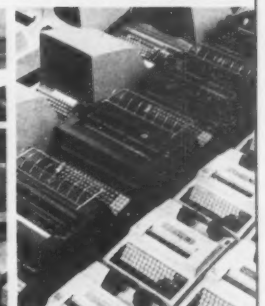
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Calcomp Also Gets Means to Voting Control Both Boards Approve Sanders-Calcomp Merger

NASHUA, N.H. — The boards of Sanders Associates, Inc. and California Computer Products, Inc. have approved a merger agreement whereby Calcomp would become a wholly owned Sanders subsidiary.

The deal is valued at about \$38 million and involves an exchange of .34 share of Sanders stock for each of 2.2 million outstanding Calcomp shares, according to John Ruggiero, Sanders treasurer. Sanders already owns 35% of the California firm's stock.

The directors of both companies also approved a proposal to give Sanders voting control of Calcomp before stockholders vote on the merger. Un-

der this proposal, Calcomp will issue 500,000 shares of new 8% voting preferred stock which Sanders will purchase for \$6.35 million in cash and convert the Calcomp \$7.69 million three-year subordinated notes held by Sanders.

With these additional shares, Sanders will have 54% of the voting power of Calcomp. However, Sanders cannot vote any of its shares at the stockholders meeting, which will be held to vote on the merger. That meeting will not be held until after Jan. 1, Calcomp said.

Objections to these terms were raised recently by Lester Kilpatrick, a Calcomp founder and director, who

stated, "I strongly object to giving Sanders control now, before any approval of the merger by our shareholders." Kilpatrick, who owns 66,693 of Calcomp's outstanding shares, plans to solicit proxies to defeat the merger and elect a majority of the Calcomp board at the next shareholders' meeting.

Prior to the Calcomp board meeting on Oct. 22, Kilpatrick filed suit in Los Angeles Superior Court to block the merger, a source close to the negotiations disclosed.

Kilpatrick's vehement objection to the merger centers around the price Sanders will pay for the remaining stock under the .34 exchange ratio.

Based on a recent trading price of \$24.50 per share for Sanders, Calcomp shareholders would receive about \$8.33 per share.

This is significantly lower than the \$13.50 per share Sanders paid last May to acquire 1.3 million shares of Calcomp.

Kilpatrick also opposed a proposal announced earlier this month by Sanders and a selected executive committee of the Calcomp board which called for five present Calcomp directors to resign and five Sanders people to replace them. Last week, however, Ruggiero said, "We are not planning to make any management changes at Calcomp."

PCMs, IBM Play Catch-Up Game

(Continued from Page 73)

nology and with production economies of scale.

Further, the Data Processing Division cannot announce new products too rapidly because it has a responsibility to its user base. "IBM is just as locked into 370 upgradability as anyone else," Gold commented.

These constraints will give the PCMs some time to gather strength. However, in the near term, PCMs must gain credibility. One credibility issue raised by some executives is whether PCMs have the ability to service their products on a widespread geographic basis and capture reasonable margins.

Unlike some other analysts, Gold does not expect IBM to introduce the "H" series until late 1980 or early 1981 because of heavy commitments to Series 30 shipments. And unlike the introduction of the 4300, the introduction of the "H" series will not be very dramatic because the machines will offer only two to three times the price/performance of the Series 30.

With the delay of the H, Gold thinks some PCMs can solidify their positions. In particular, he noted the delay will help Amdahl Corp. recapture its equilibrium.

By the time the H is introduced, Amdahl will own its machines and be able to convert them to sales, thus buying its future, he said. Moreover, Amdahl is adept at modifying its operating software to new IBM applications.

Assessing the chances of survival of the newer PCMs, Gold was bullish on Magnuson Systems Corp. because of its heavy emphasis on microcode, which renders the equipment "soft." On the other hand, he was not overly optimistic about National Semiconductor Corp.'s ability to compete because it has a "hard machine."

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Brazilian Manufacturers Form Industry Group

By Marcy Rosenberg

CW Staff

SAO PAULO, Brazil — Though they share the Brazilian government's goal of weaning the country's young computer industry from dependence on foreign parts and designs, local computer and peripherals makers are rallying to first ensure ample technological resources on their own shores.

Their collective voice will be heard through a nongovernment-sponsored industry group, the Association of the Brazilian Computer and Peripherals Industry (Abicomp), formed last month. Membership is limited to the 30-odd Brazilian-owned manufacturers and not open to multinationals, even if they manufacture equipment in the country.

The association's charter is to help create the conditions necessary for developing Brazilian DP technology, according to Edson Fregni, president of domestic terminal manufacturer Scopus and that firm's Abicomp representative.

Toward this end, Abicomp advocates, first, that multiple local sources of semiconductor technology be formed and, second, that IBM be required to meet the same government-established criteria imposed on other foreign companies seeking to manufacture computers and associated equipment in Brazil.

These criteria call for non-Brazilian firms to disclose their technology to Brazilian joint venture partners and to demonstrate that within five years

products could be manufactured in Brazil without importing any assemblies or ideas.

IBM Exemption

Fregni claims IBM, which has been manufacturing 370/148s here for several years and which recently received government approval to build 4341s, has not met these conditions. "IBM does not design equipment in Brazil; it does assembly and testing only," he said. "IBM should be allowed to stay in Brazil provided it uses a higher national content of parts, but not if it continues to import the recipe and parts to only plug together here."

Why is IBM exempt from the government's restrictions on foreign manufacturers? Fregni offered some

possible explanations: "IBM offers good machines and software and has well-trained people that provide good support." In addition, its name carries a "status image, and the firm has several special interest groups in the government," he stated.

For the time being, Brazilian computer companies aren't worried about competition from the 4341 since they are predominantly manufacturers of minicomputers — a market reserved for them by the government. And as another safeguard for local business, the government, which must approve most computer and peripherals acquisitions by users, encourages purchases of domestically produced products.

"While some users prefer to spend more money to buy IBM medium-scale machines, it is only a small percentage," Fregni noted.

He cautioned, however, that as users' requirements increase and as local manufacturers venture into the mid-range system business — as two have already done [CW, Oct. 29] — "we will fall into head-to-head competition with IBM," said to now control the medium-scale market in Brazil.

Nationalization of Parts

Another problem plaguing Brazilian computer and peripherals manufacturers is an almost total reliance on imported components. In line with a five-year plan for achieving 100% nationalization of parts — which has so far cost about \$40 million in private and government capital — the government is said to be drafting a proposal for developing a local semiconductor manufacturing capability.

The implementation of this plan, however, may not be in the best interests of domestic equipment producers, Fregni explained.

As he understands it, the proposal, which has not been formally announced, would involve the formation of one Brazilian company to manufacture components. Semiconductor technology would be acquired from local universities in stages — first, by packing imported wafers and next, by actually growing and preparing wafers domestically. All local equipment designers would then be required to use that firm's components.

What concerns Abicomp is that while such a plan would ease or eliminate Brazil's dependence on Japanese and U.S. semiconductor suppliers, it could leave domestic equipment manufacturers dependent on a sole source of components.

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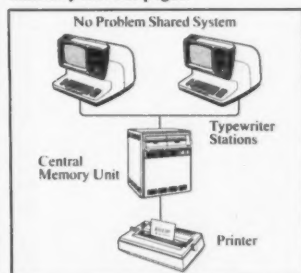
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Blankenship to Lead Adapso Next Year

COLORADO SPRINGS, Colo. — Buck Blankenship, president of Data Processing of the South, Inc., was elected 1980 president of the Association of Data Processing Service Organizations, Inc. (Adapso) at the group's 19th annual meeting, held here recently.

Since its last annual meeting, Adapso added 75 members to its ranks, increasing its membership 25%. Membership now stands at 370 corporations.

Adapso reported that 80 of its members have agreed to participate in the Software Information Exchange program with IBM, which began in April [CW, July 16].

Of particular interest in 1979 was

the recognition of the special needs of small businesses within the service industry. To best serve the under-\$5 million firm, Adapso voted to split its former Education and Self-Development Committee into two separate committees.

The new Small Business Interests and Education Committee will hold several seminars for small business members during the year, as well as engage in special advocacy efforts in Washington, D.C. Art Kramer, president of Praxa Data Centers, Inc., is the 1980 Adapso vice-president in charge of this committee.

The second half of the original committee will be known as the Ad-

ministration and Self-Development Committee, responsible for the research and statistical function for Adapso. Lawrence Schoenberg, president of AGS Computers, Inc., will serve as the vice-president in charge of this committee.

New Officers

Besides Blankenship, other officers elected at the annual meeting, held in conjunction with three-day management conference, included Robert Weissman, president of National CSS, Inc., who will be the senior vice-president for Adapso next year.

James Houtz, president of Cycare Systems, Inc., will be treasurer.

Scots Courting American Firms

NEW YORK — Hot on the trail of electronics companies, The Scottish Development Agency (SDA) recently opened a permanent office here and staged a 12-city U.S. promotional tour.

While Scotland, like other European countries, is seeking production jobs for its workers, it is particularly interested in creating employment for its electronics graduates. Digital Equipment Corp., for example, is developing software products in Scotland, according to James S. Gorie, an SDA representative.

Eight universities in Scotland offer training in microelectronics, Gorie noted, adding that these universities have a lot of technology transfer with U.S. universities, most notably MIT and Stanford University.

During this decade electrical engineering studies have increased 62%, reflecting the decline of such traditional Scottish industries as shipbuilding and metalworking, which shrank 28% and 20% respectively during the decade. There has not been sufficient employment in the electronics industry in Scotland, so university graduates have been heading for the tempting California and Massachusetts electronics enclaves.

Firms such as NCR Corp., IBM and Burroughs Corp. that now make computer products settled in Scotland after World War II. Because the UK government recognized the need to attract other companies to Scotland, it created the SDA three years ago.

Today some 107 U.S. and foreign electronics-oriented firms have opened plants in Scotland, most of them in central Scotland, according to the SDA.

Other computer industry firms already in Scotland include Hewlett-Packard Co., Univac, National Semiconductor Corp. and Motorola Semiconductor Products, Inc. Both National Semi and Motorola have announced plans to expand their Scottish plants.

Competition With Irish

However, competition for U.S. electronics firms is brisk. France, Germany, Britain and Ireland have organizations committed to attracting these businesses to their countries, Gorie noted, adding that he thinks there is too much bidding among countries.

Scotland offers companies rent-free plants for two to five years and up to 22% of their start-up costs. Moreover, soft loan money with interest rates of 3.5% and tax incentives reduce corporate taxes to an average 16%.

Despite these incentives, the SDA competes fiercely with the Industrial Development Authority (IDA) in Ireland, which offers higher start-up allowances and training grants and lower tax rates [CW, Feb. 26].

However, the SDA maintained that Scotland has more engineers, a more industrial-oriented work force and less strike disruption in public services such as mail and telephone.

The rivalry between the SDA and IDA was most recently evident in the vying for Mostek Corp., which eventually decided to locate in Ireland.

Of its 600 employees the SDA has 30 people working on marketing the country to foreign business. Four employees work in the U.S., one in San Francisco and three in New York.

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Session 1.3 Information Systems Planning for the 1980's Corporate Environment

Session 1.4 Managing the Proliferation of Minicomputers

Session 1.5 Decision Support Systems and Their Applications

Session 2.1 Project Management Techniques and Standards for DP

Session 2.2 Structured Methods to Improve Quality and Productivity in System Development

Session 2.3 Capacity Planning — An Essential Part of Managing the Computer Resource

Session 2.4 Improving Productivity in Software Development

Session 2.5 Audit and Control Techniques for Expanding Information Systems

Session 2.6 Improving Productivity in Implementing Information Systems

Session 3.1 Multiple Minicomputers as Mainframes

Session 3.2 Interactive Graphics — A New Approach to Data Analysis for Management Planning and Decision Making

Session 3.3 The Changing Concept of Distributed Data Processing

Session 3.3A Integrating Voice and Data Systems

Session 3.4 Mass Storage Systems Performance and Economic Trends

Session 3.5 Computer and Communications Security for Data Processing

Session 3.6 Image Processing in the 1980's

Session 3.7 Input Systems

Session 3.8 Data Base Processors

Session 3.9 Data Communications Alternatives for the 1980's and Their Implications

Session 3.10 A New Methodology for Planning Data Base Supported Information Systems

Session 3.11 Status Report on Communications Networks

Session 3.12 New Approaches to Data Base Long Range Planning

Session 3.13 Systems to Improve Data Output and Dissemination

Session 3.14 Trends and Future Opportunities for Distributed Data Bases

Session 3.15 Techniques in Data Base Administration

Session 4.1 System Planning for Information Management in the Office

Session 4.2 Technologies for Information Management in the Office

Session 4.3 Organizing for Office Automation

Session 4.4A The Office of the Future Today Part 1 of 2

Session 4.4B The Office of the Future Today Part 2 of 2

Session 5.1 Report on 1980 Word Processing Systems

Session 5.2 Applications and System Considerations for Integrated Word and Data Processing in a Minicomputer Environment

Session 5.3 Using the Word Processor as an Input/Output Terminal to a Computer

Session 5.4 Optical Character Recognition — A Mature Technology That Can Increase Data Entry Productivity

Session 5.5 Data Processing in the Word Processing Environment

Session 5.6 Photocomposition and Electronic Printing — Alternatives and Integrated Systems Design

Session 5.7 Alternative Implementations for Word Processing in a Multi Office Environment

Session 6.1 Getting Started in Word Processing

Session 6.2 Implementing a Word Processing/Administrative Support System

Session 6.3 Improving Productivity in Word Processing After You've Started

Session 7.1 Getting Started in Business Data Processing

Session 7.2 Using Small Computers in the Manufacturing Environment

Session 7.3 Procurement and Implementation of a Small Business System

Session 7.4 Accounting and Cost Control Systems for Small Business Computers

Session 7.5 Clinic for Executives Concerned About Their Small Business Systems

Session 7.6 Office Automation for Small Business Organizations

Session 8.1 Impact of Information Systems on Financial Management in the 1980's

Session 8.2 Strategic and Long Range Planning Systems for Financial Management

Session 8.3 Budgeting and Operational Planning Systems

Session 8.4 Information Systems for the Planning and Control of Capital Expenditure

Session 8.5 Selected Topics in Financial Information Systems

Session 8.6 Long Range Systems Planning in the Finance Organization

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National Semi Tones Down Nasco's Management Style

(Continued from Page 73)

claimed.

Earlier in the shareholder's meeting, National Semiconductor President Charles Sporck conceded his firm had experienced a slowdown in orders for Intel equipment during August and September. But in light of the bad publicity surrounding Intel's recent departure from the computer industry, a stall in some contract negotiations was to be expected, he said.

By the end of fiscal 1980, Sporck added, the former Intel Computer Systems Division will become profitable and will be contributing significantly to the earnings of National Semiconductor's overall computer operations.

Turning his attention to other subjects, Sporck emphatically denied rumors his company is considering selling its operations to outside interests. "We're violently opposed to independent semiconductor companies being taken over either by foreign giants or by local monoliths," he said.

In a prepared presentation, Sporck also reiterated his concerns about the electronics industry's growing labor shortage. The skilled technical personnel needed to meet the semiconductor field's rapidly growing demands are becoming increasingly difficult to find and train, he said.

In fact, without a heavy reliance on automated assembly equipment, National Semiconductor would have found itself unable to address its current customer demand, he noted.

Sporck also warned again of the "very real" threat U.S. semiconductor

and computer equipment manufacturers face from growing Japanese competition. Unlike their American counterparts, which must perform efficiently and earn a profit to secure the development funds necessary for growth, Japanese electronics companies can operate at a loss and still stay in business because they have access to unlimited subsidies from their government and central financial institutions, Sporck said.

Unless U.S. firms can gain similar sources of funding or exert pressure on Japan to change its ways, "I don't see how the Japanese policy can fail in the long run," the National Semiconductor president said.

BBN Spins Off Subsidiary To Market Pluribus

CAMBRIDGE, Mass. — Bolt Beranek and Newman, Inc. (BBN) has formed BBN Computer Corp., a wholly owned subsidiary which will market the Pluribus multiprocessor originally developed by BBN for Arpanet.

Prior to the spinoff, BBN operated the subsidiary as a subdivision. According to a spokesman, the creation of the subsidiary will result in identifying management for the public, establishing the subsidiary's image and visibility as a separate entity and instituting an operating framework.

The Pluribus is a high-speed multiprocessor used as a node in

packet-switching data communications networks. Since its development for Arpanet, it has been modified for use in other government and commercial networks, BBN noted.

Within the next year, BBN Computer Corp. will make available a Microprogrammable Building Block System that can emulate other systems, according to the firm.

Frank E. Heart, a BBN senior vice-president and director of the Computer Systems Division, is chairman of the new subsidiary; W. B. Barker, a member of the division and one of Pluribus' original developers, is president.

Nickels & Dimes

Honeywell, Inc. declared a quarterly dividend of 65 cents per share payable Dec. 17 to shareholders of record Nov. 30.

\$\$\$

American Microsystems, Inc. has arranged a \$22 million revolving credit with three banks. Under the agreement, the three banks — The First National Bank of Boston, the Dresdner Bank AG of Frankfurt, West Germany and Wells Fargo Bank — will share equally in any loan commitments.

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Management Assistance Inc. has received approval for listing its common stock on the New York Stock Exchange. Trading will begin Nov. 5.

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Service Firms Seen Undeterred by IBM Releases

COLORADO SPRINGS, Colo. — Recent IBM product introductions, including the System/38, the 8100 and the 4300 series, have had a minimal impact on the computer services industry to date, a recent survey revealed.

Of all the IBM offerings, the 4300 has had the greatest impact on service companies both as resellers of hardware and as providers of computing services, according to Stephen H. Seidman, a California-based independent consultant who recently conducted interviews with several key service firms.

The most severe side effect of the 4300 has been the acute depression in the IBM 370 market, Seidman told a group of executives at a recent Association of Data Processing Service Organizations, Inc.

(Adapso) management conference.

While the System 38 has caused some confusion among users considering the in-house vs. service bureau option, the impact of the 8100 has been scant. It is almost as if it had never been introduced, Seidman said.

The 4300 announcement has had both positive and negative effects on service companies. Those firms locked into long-term 370 leases are the most seriously hampered by the 4300, Seidman suggested.

On the other hand, Automatic Data Processing, Inc. (ADP), for example, reported it could acquire a 370/148 on a two-year lease for only \$6,500/mo, thereby passing on savings to customers. However, ADP also told Seidman it would take delivery on

40 of the 4341s if it could get them because it could also pass on savings by using these systems.

Service firms that resell hardware, with one exception, appear to have little interest in the 4300 product line. In fact, Seidman found that those companies already offering turnkey systems have little interest in converting to selling IBM equipment.

While the 4300 has created a stir among service companies, the lack of software for the System/38 and the 8100 is the

most severe deterrent to an IBM attempt to make inroads into the service industry, Seidman said.

However, some service companies interviewed were afraid that first-time users will be lured to the System 38 because they do not thoroughly understand the software problem.

It is rumored that IBM plans to put more money into OEM software tools for the System/38, Seidman said.

Again, the lack of software for the 8100 is expected to provide opportunities for

some service firms. Yet Seidman warned that the threats of the 8100 lie three to five years in the future if IBM is successful both in marketing the 8100 and providing an economical satellite communication capability.

If IBM has success in these two areas, service firms whose customers are mainly interested in networking services will probably switch from the service company to an in-house system operating in conjunction with IBM's satellite services, Seidman said.

To Beef Up Corporate Growth Burroughs Eyes Five Market Areas

By Connie Winkler

CW Staff

NEW YORK — Burroughs Corp. is looking at five key areas to beef up its growth rate — terminals and communications, small computers, software products, office automation systems, and the service sector.

The firm expects these areas to complement its mainframe business and maintain a 15% annual growth rate, Chairman Paul S. Mirabito recently told the New York Society of Security Analysts.

"Burroughs' objective is to grow at a faster rate than our industry," said Mirabito, who at the end of 1980 will turn over the corporation to recently deposed U.S. Treasury Secretary W. Michael Blumenthal [CW, Oct. 22].

After the analysts' meeting, J. Roy Henry, Burroughs executive vice-president of marketing, said the company conducts a continuous program of weeding out nonproductive sales employees. He explained that 200 sales people may have been let go in the last

several months, but this covered all of the Burroughs 800 branches around the world.

Burroughs sales force numbers 10,000. "There's been no reduction in the sales force as such," Henry maintained.

There has been only a "small tendency" in the last two months toward lease over purchase Mirabito said. This tendency is more pronounced in the small systems business, Henry added.

Unlike other computer makers, notably IBM, Burroughs said it hasn't seen any big impact because of poor economic conditions or customers' hesitancy to buy now because of uncertainty about future products. Burroughs has always maintained about a 50-50 ratio on lease to purchase.

In October, Burroughs announced the B1900 series of mid-range advanced computers, the B90 series of small computers and a new Redactor family of word processing systems, the R III.

"The small systems market has been an area of great Bur-

roughs strength," the chairman said. "With the B90 series, we will reassert our market strength and regain our share of this important, fast-growing market."

This year Burroughs is experiencing a 25% to 30% growth rate in terminal units, particularly in the TC and BMT series, which incorporate microprocessors and eliminate separate controllers.

To counteract the shortage and rising costs of professional skills, Burroughs is expanding its software products, which reduce system development and programming costs, and developing application packages.

Burroughs is tapping into the word processing market because it is expanding even more rapidly than its parent data processing, Mirabito noted.

And, although it is a small percentage of the business, Burroughs is growing its OEM business in disks, peripherals and transport devices.

Export Regulations Become Law

(Continued From Page 43)

hard-line stances taken by several members of Congress, the act basically continues the regulations already in existence.

And while Congress did delete from the final version of the bill a House of Representatives proposal to give the DOD more of a say in the license approval process [CW, Sept. 24], computer sales to the Soviet Union and other eastern bloc nations still face lengthy delays.

As originally proposed, the DOD will draw up a list of "critical technologies" subject to export control, but the final version of the legislation provides that the list will be part of the overall export licensing mechanism under the primary direction of the Commerce Department.

The new law further restricts license denial for foreign policy purposes — a move industry representatives hope will curtail such decisions as the Cyber 73 veto. Contrary to DOD statements, CDC officials believe the Cyber decision is part of Carter's "get tough" stance vis-a-vis the Soviet combat troops in Cuba.

Here too, computer mainframers are not entirely sanguine about the legislation's efficacy. The White House recently instituted a policy of reviewing all DP export applications for products sold to communist countries. This move not only lengthens the license approval process, but could lead to more license denials on the basis of national security.

The export control law does, however, contain several provisions

the DP industry lobbied for. These include:

- A provision calling for speedier license review in general and requiring that the exporting company be notified of the steps, it can take to modify its license request to gain government approval if its license request has been denied.

- A provision requiring the Commerce Secretary to oversee the "indexing" of the commodity control list. Indexing is the process which items considered "obsolete with respect to the national security of the United States" are removed from the list.

- A provision barring disclosure of confidential information supplied by firms when they seek export licenses.

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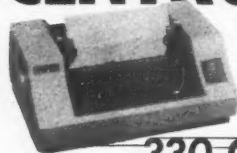
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Major fin'l co. needs 2+ yrs. BAL OS for several new projects. Also COBOL positions open. To \$27,100.

EDP CONSULTANT

International CPA firm has requirements for several qualified EDP professionals. 4 yr. degree + solid system design exper. Prior CPA firm exper. a +. To \$35,000 + bon.

SYSTEMS ANALYST

Electronics mfg. co. needs solid mfg. applications exp. preferably with data base & communications. To \$30,000.

Relocation costs are paid by these client companies.

Contact Duncan White
ROBERT HALF
of Los Angeles
Los Angeles, CA
(213) 388-6805

3600 Wilshire Blvd. Ste. 1914
Commerce, CA
(213) 721-2197
ROBERT HALF
of Orange County
2333 N. Broadway, Ste. 200
Santa Ana, CA
(714) 835-4103

HOUSTON

State-of-the-Art environments! Planned career growth. If these are important to you, you should be in HOUSTON.

MVS Systems Programmer\$18-35,000
DOS Systems Programmer24-26,000
IMS Data Base Analysts23-31,000
Project Ldrs-Banking20-26,000
Sys Analysts-Financial20-31,000
Sys Analysts-Manufacturing18-28,000
Sys Analysts-Gen Ledger23-30,000
Programmer-IMS18-24,000
Programmer-OS18-22,000
Programmer-ALC18-24,000
Programmer-DOS18-20,000
Programmer-CICS18-22,000
Programmer-DEC PDP 1118-25,000

If you are interested in relocating to the SUNNY HOUSTON AREA, please call JIM FLEMING collect or send your resume to:

ROBERT HALF
of Houston, Inc.
Two Allen Center, Suite 1765
Houston, TX 77052
(713) 757-1144

CHICAGO

STOP!

Start your own small "state-of-the-art" shop! Your 7 to 10 years of heavy commercial & financial experience includes design and implementation of new systems. You still like to program (COBOL) and will EXCELL in this "pressure-cooker" environment. EXCEPTIONAL OPPORTUNITY! \$30,000+

Amy Nielson
ROBERT HALF
of Chicago
35 E. Wacker Drive
Chicago, IL 60601
(312) 782-6930



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PROGRAMMER ANALYSTS

Many openings for experienced veterans of small and large installations in the healthy economies of Washington, Oregon, Idaho and Alaska. Banking, Insurance, Forest Products Distribution... Visiting here? Call me collect to discuss jobs and set up interviews.

Ray Magill
ROBERT HALF
of Seattle, Inc.
1301 5th Avenue, Suite 2626
Seattle, WA 98101
(206) 624-9000

BOSTON

SR. SYSTEMS PROG.

Small but prestigious capitol goods mfr. seeks tech-oriented indiv. to support IBM 370/138 DOS/VS sys. Will be only sys. prog. on staff. Beautiful central Mass loc. Salary \$26,000.

CICS SYS. DESIGNER

Established services org. seeks promotable CICS & fin'l. apps. prog. IBM 370/158 OS/VS, VSAM, ROSCOE. Must be business-minded & task oriented. Salary \$28,000 + incentive bonus.

DATA BASE ANALYST

Prestigious software consulting firm requires specialist for design & implementation of new data base sys. SYS-2000, DMS-1100, IMS or IDMS bkgd. pref. Technically challenging pos. for dynamic self starter. Salary \$27,000.

SYS-3/4 MGR

So. N.H. Expanding mfr. requires EDP Mgr. to direct growing dept. IBM Sys-3/4, RPG, BOMP, MRP Environ. Reports to Controller. Salary \$28,000.

DL-1 HEAVY

MIS div. of major Boston fin'l. services org. requires DL-1 pro. for new develop. proj. IBM 370 DOS, COBOL, POWER CICS environ. Unlimited tech. challenge with a progressive co. Salary \$27,000.

Gerry Battista
ROBERT HALF
of Boston, Inc.
100 Summer St.
Boston, MA 02110
(617) 423-1200

PROVIDENCE

D.P. DIRECTOR

Large division of "Fortune 100" company. MBA preferred. Must have IBM 360 to 370 conversion exp. Supv. staff of 30. Aggressive individual with proven managerial Track Record in Mfg. \$35,000

PROJECT MANAGER

Degree preferred. UNIVAC 90-40 environment strong On-Line systems expertise the key to growth in this stable financially sound company. \$25,000

PROGRAMMER ANALYST

B.S. Degree a must—MBA a plus. Blue Chip Int'l Mfg. seeks IBM 370 ANS COBOL OS JCL expertise—exposure to IMS/TP a plus. Excellent growth for a promotable person. \$27,000

SYSTEMS ANALYST

Large Gov't contractor seeks a technical individual with communicative skills who wants a challenging IBM On-Line systems environment. Heavy user interface leads to Mgmt. \$25,000

Dee Ecker
ROBERT HALF
of Providence, Inc.
400 Turks Head Bldg.
Providence, RI 02903
(401) 274-8700

HARTFORD

PROJECT MGR.

Internatl. trvl. oppty. with Conn. corp'l indiv. will act as Internal Systems and Procedures consultant. Excellent career path to Sr. Exec. level. Salary \$30,000.

SYSTEMS ENGINEER

Conn. shoreline corp. seeks indiv. to join "think tank" staff. Resp. for current/future State-of-the-Art planning for lg. IBM user. Very visible position. Salary to \$27,000 for min. 2 yrs. exp.

SYST PLANNER

Conn. corp. seeks indiv. to provide short/long range hardware/software planning for lg. data center. Resp's. include vendor & contract negotiation. Salary \$30,000.

IMS SPECIALIST

Outstanding corp. on Conn. shoreline seeks exp'd. Data Base pro. Tech IMS orientation mandatory. Planning & installation of major D.B. system for this well known mfg. Salary \$30,000.

PROG. ANALYST OS

Ind. leader offering exceptional oppty. for talented COBOL, P/A. Multi-main frame lg. scale IBM, TSO, PANVALET. Superior benefits, flexible hrs. Central Conn. location. Salary \$22,000.

OPERATIONS RESEARCH

Economic research & ops. research bkgd. sought for major corp. Forecasting & statistical analysis. Grad. degree + FORTRAN required. Diversified fin'l. institution in scenic CT. Salary \$24,000.

SOFTWARE SPEC.-CONN.

OS/VS1, CICS exp. qualifies for unique position allowing indiv. to determine own work days & hours. Very professional, unstructured environment. Salary \$26,000.

Stan Durbas / Paul Meissner

ROBERT HALF
of Hartford, Inc.
111 Pearl Street
Hartford, CT 06103
(203) 278-7170

BUFFALO

V.P. OF DATA PROCESSING

Client co. located in WNY needs D.P. director with exp. encompassing all facets of systems development, administration & technical expertise. State-of-the-art installation is expanding & requires proven leadership. Salary \$40,000.

D.P. MANAGER

Consumer products mfr. needs Sys 3 "pro" to implement hvy. mfg. systems; IPICS/MRP, order entry etc. Strong mgmt. skills a must. Hi-visibility position located in Finger Lakes area. Salary \$30,000.

SYSTEMS ANALYST

Aggressive systems pro with design & implementation exp. must be ready to step into mfg. or acq. sys. area. Sophisticated CICS/DLI shop needs analyst to round out exceptional peer group. Reports directly to mgr. & position offers hi-visibility. Salary \$25,000.

SYSTEMS ANALYST

Blue Chip corp. headquartered in CNY. Finger Lakes region needs accomplished mfg. analyst to take over systems project. Must be capable of liaison with line mfg. mgrs. & programming staff. MRP & financial reporting sys. design is the key to this growth pos. Degree. Salary \$28,000.

ANALYST PROGRAMMER

We are recruiting for several NY State clients with both lg. COBOL installations & smaller more intimate Syst. III RPG II shops. Promotable positions available in financial & mfg. Salaries to \$22,000.

R Siegal
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of Buffalo, Inc.
1310 Liberty Bank Building
Buffalo, NY 14202
(716) 842-0801

SAN FRANCISCO

SEEKING A CHALLENGE AS WELL AS A CHANGE? SEE WHAT WE CAN ARRANGE.

COBOL PROGRAMMERS

Move to sophisticated state of the art... on-line data base environments. Many clients have multiple openings throughout the Bay Area.

PROJECT MANAGER

Need broad business perspective with background in S/A or project management. Will supervise strong technical group-possible foreign travel. Reloc paid. \$27,000

SR. SYSTEMS ANALYST

Must have solid user/communication skills to interface with clients and identify systems requirements. Background should include 5 yrs as P/A-S/A. Insurance, DEC. Basic, COBOL all are pluses \$26,000

OPERATIONS MANAGER

Getting 4331, needs one who will direct operators, data input and contract programmers. "Shirtsleeves Manager"... \$21,000, reloc considered.

SYSTEMS PROGRAMMERS

EITHER MVS, VS, VM. Converting VS1 or VM-needs your help now... \$24,000.

EDP AUDITORS

We have several excellent opportunities for junior and senior level people. Salary ranges... \$20-35,000.

CALL US COLLECT TO DISCUSS THE ABOVE AND OTHERS NOT LISTED. CONFIDENTIALITY RESPECTED IN ALL RESPONSES.

Jerry Anderson
or
Bob Couch
ROBERT HALF
of N. Calif.
111 Pine Street
San Francisco, CA 94111
(415) 434-1900



PHOENIX

SOFTWARE SUPPORT SPECIALISTS

World leader in minicomputers seeks highly qualified individuals who have hands on experience with DEC PDP-11 operating under RSX-11 or RSTS/E. If you are interested in an environment of constant challenge and reward this spot is for you. Salary 20-25K.

SYSTEMS ANALYST

You will need the ability to interface with various levels of management and may act in a project leader capacity with responsibility for the work assignments and direction of other analysts. Three years experience as a systems analyst desired. Salary 21-23K.

PROGRAMMER/ANALYST

This is a challenging position for a talented individual who has three plus years experience as an assembly language programmer. A key position in a fast growing company. Salary 18-22K.

Roc Rogers
ROBERT HALF
of Phoenix, Inc.
3550 N. Central Ave #1504
Phoenix, AZ 85012
(602) 264-6488

DENVER

SYSTEMS ANALYST

National energy organization is opening a corporate data center in Denver. Company needs an analyst with proven business systems development skills. Should have background in COBOL and on-line applications. Start \$27,000 range.

PROGRAMMER ANALYST

Large Denver based financial organization needs a programmer analyst with at least 1 yr. COBOL business systems on IBM 370 DOS-VS hardware. Any BAL or CICS exposure would be helpful. Start \$22,000 range.

For further information on how to find that right position in the Rockies, contact:

ROBERT HALF
of Denver, Inc.
2 Park Center Suite 747
Denver, CO 80202
(303) 629-1010

TAMPA

PROG/ANALYST

Solid nat'l corp has urgent need for IMS cobol exp... TO: \$24K

BANKING

All levels P/A up-IBM or Burr DDA-LOANS-GOOD Cobol... TO: \$20K

PROG/ANALYST

State of art shop-DOS/VS CICS 1 yr plus exp-Cobol... TO: \$19K

TECH WRITER

Co desperate! 2 plus yrs exp software techwritng... TO: \$22K

PROJ LDR

Fortune 500 Co-GOOD comm skills IMS/Cobol/Mfg... TO: \$25K

Stan Allen
ROBERT HALF
of Tampa, Inc.
1311 North Westshore Blvd.
Tampa, FL 33607
(813) 676-4191

MILWAUKEE

DP MANAGER

Ready to manage a small DP shop using RPG II? Any second programming language would be a plus. You would be responsible for several people in the area. This progressive company allows initiative on your part to develop the D.P. department to be most efficient. \$25-30,000

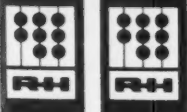
MGR MANUFACTURING SYSTEMS

If you are the take-charge type individual with solid knowledge of MRP, DBOMR inventory control and other manufacturing concepts, this challenging position would definitely interest you. \$25-30,000

EDP AUDITOR

If COBOL programming & accounting systems are in your background and you need an opportunity to combine the two, let us discuss this position with you. The position is with a leader in the financial field. \$22-28,000

Dave Weiner
Stan Mundro
ROBERT HALF
of Wisconsin, Inc.
777 E Wisconsin,
Milwaukee, WI 53202
(414) 271-9380



ROBERT HALF

MINNEAPOLIS

SYSTEMS ANALYST

Mpls. client has super opty to advance into project leadership. Project exp., COBOL, design skills, data base IDS, Honeywell bkgd., and T/P are important qualifications. This position requires user interface at all levels of mgmt. Company may relocate the qualified applicant. Compensation \$30,000 range.

PROG'S THRU ENGINEERS

Established Twin City mfr. has many openings from programmers to systems engineers available. Company seeks all levels of experience (1 1/2+ years.) working with IBM/370 BAL. Resps. range from software development, customer support to engineering. Paid relocation. Salaries to \$28,000.

PROGRAMMER ANALYST SYSTEMS ANALYST

Two positions available with this prominent Iowa mfg. firm. Company prefers large IBM OS/VS with accounting application bkgd. This firm is currently developing IMS. Solid company, offers paid relocation. Salaries to \$26,000.

SR. PROG./SYSTEMS ANALYST

Mfg. firm in Wisconsin has immediate opening for experienced & professional Programmer/Sys. Analyst. NCR/NEAT III is important; mfg. bkgd. necessary. Company will pay relocation. Salary Mid-20's.

Kathi Grant
ROBERT HALF
of Minnesota, Inc.
2236 IDS Center
Minneapolis, MN 55402
(612) 339-9001



ALBUQUERQUE

NCR

Major New Mexico company seeks Asst. DP Manager. NCR 8450 in Cobol, Neat 3. On-line. \$25,000 range.

COBOL

Leading New Mexico mining company seeks Cobol programmer. Financial applications, 370/DOS. Computer related degree required. \$18,000 range.

Dick Starnes
ROBERT HALF
of New Mexico
P.O. Box 3320
Albuquerque, NM 87190
(505) 266-5557

LOUISVILLE

SYSTEMS ANALYST

Southern company looking for systems people with Univac 1100 experience. Will be the leader. Excellent benefits. Salary to \$30,000.

DATA BASE ADMINISTRATOR

Super company looking for IDMS, IMS, or total people. Co. has 370/143. New position, lots of growth. Co will move fast. Salary to 30,000.

ROBERT HALF
of Louisville, Inc.
660 S. 4th St.
Louisville, KY 40202
(502) 585-1751

CALL DAY/NITE/WEEKENDS

ST. LOUIS

ENTRY SYSTEMS PROG. To \$20K

Degree plus knowledge of BAL, FORTRAN, 370's or mini's qualifies you.

MAJOR FIRM!

ENTRY BUSINESS PROG. To \$20K

Degree in Computer Science, Math or Business with 12 hrs. DP coursework gets you started.

SUPER OPPORTUNITY!

SCIENTIFIC PROG. To \$30K

Senior level position with industry leader Degree in Math C/S or Physics, 5 yrs. FORTRAN, PL1, engr. environment.

NEW OPPORTUNITY!

SR. CONSULTANT To \$34K

Degree, 8 yrs. DP exp., IMS background.

CONSULT WITH A LEADER!

SR. NETWORK SUPPORT To \$28K

OS/JCL utilities exp. necessary in time-share or communications environment.

OPPORTUNITY!

DIGITAL DESIGN ENGINEER To \$36K+

BS-EE or Physics and at least 6 yrs. exp. in digital design in mini's, micro's or I/O devices.

STATUS!

NATIONAL ACCOUNT MANAGER \$60K+ Potential

5 yrs. computer "iron" sales exp., and exposure to minis qualifies you for this EXCEPTIONAL SALES POSITION, marketing minis to a seven state area from St. Louis. Heavy travel, but "heavy" earnings. Salary, commission and expenses. Established account manager.

ACCOUNT MANAGERS \$40-60K Potential

3 yrs. sales of hardware, software or services required to "peddle" minis in St. Louis area. Average salesman earned over \$40K last year. Draw provided.

MINI-COMPUTER PROG/ANALYSTS To \$24K RPGII-BASIC

Mini-computers are NOW in St. Louis. Our clients are ANXIOUS TO HIRE! 6 mos. RPGII or BASIC exp. qualifies you for these EXCEPTIONAL, customer-oriented OPPORTUNITIES.

SOFTWARE SPECIALIST To \$28K

3 yrs. OS/VS BAL, JCL exp., MVS, IMS, VTAM a big plus! TOP financial ORGANIZATION, EXCEPTIONAL FRINGES!

PROJECT MANAGER Sys 3/32 SHOP To \$24K

Total responsibility for systems development for subsidiary company. HIGH VISIBILITY!

SR. PROG/ANALYSTS To \$27K+ GO SOUTH!

GROWTH OPPORTUNITIES with top firm in Southeast! 2 yrs. IBM 370/OS exp. qualifies you for these "WARM" positions!

Charles Shaffer
ROBERT HALF
of St. Louis
7733 Forsyth Boulevard
St. Louis, MO 63105
(314) 727-1535

DALLAS

The demand for EDP professionals continues extremely high in the Dallas area. We have immediate openings at all levels... salary ranges. All fees, interview, and relocation expenses are completely paid for by our client companies...

Below are a few of the large variety of positions (many exclusively ours) currently available:

TELEPHONE SWITCHING SYSTEMS

System design for new digital telephone switching devices... seeking several career oriented key professionals to staff this new large-scale development effort. To \$32,000

INTERNALS SPECIALIST

International Dallas based firm seeks experienced DEC PDP/11 professionals. To \$30,000

SOFTWARE ENGINEERS

International vendor experiencing tremendous growth... seeking all technical levels... DEC RSX11 - D/M... PDP 11/XX RSX-11M... large staff of professional software engineers. To \$30,000

SENIOR SYSTEMS PROGRAMMERS

Expanding technical service group... technicals include: MVS-TSO-CICS-VTAM-NCP-SNA-VSAM-CPE-DDP-RJE-RMF etc... lots of working professionals. To \$29,000

SENIOR ANALYST/ PROGRAMMER

New project staffing... Large, sophisticated integrated accounting systems... COBOL - CICS (will train) - OS/VS... Good opportunity with a fine company. To \$25,000

LEAD PROGRAMMER/ ANALYST

N. Dallas multi-billion manufacturer... 370/168's 3033's - with experience in other financial systems or manufacturing systems... new system development utilizing DB/DC (will train a batch oriented person with large scale IBM background)... company has an excellent record of growth. To \$25,000

ANALYST/ PROGRAMMER

Major oil & Gas Co... requires 3-5 years large scale IBM experience plus a B.S. degree... IMS experience is a plus... seeking management potential individual for internal promotion. To \$24,000

SR. ANALYST/ PROGRAMMERS

Energy Co... good opportunity to enhance your systems design user interface skills in a highly visible position... management career path thru internal promotions... fine benefit package including profit sharing-stock option-thrift plan. To \$24,000

PROGRAMMER/ ANALYST

Major airline... new systems development... state of the art IBM technicals: MVS TSO - APL - IMS - PL/... excellent working conditions. To \$23,000

PROGRAMMER/ ANALYST

Blue-chip manufacturer... 370/148 - DOS/VSE - COBOL - ALC... seeking career oriented DP professional for a new development effort utilizing CICS/VS and a remote terminal network... 4341's coming soon for implementing their long range DP plans. To \$19,500 Call or send your resume, on a STRICTLY CONFIDENTIAL basis to:

Ron Urbach, CDP
Two Northpark East
Suite 750
Dallas, TX 75231
(214) 363-3300

SAN ANTONIO

PROGRAMMERS

Degree pref'd, APL lang. 1-3 yrs. exper only. HW 370/168, 3033. \$20,000

PROGRAMMER/ ANALYSTS

Degree pref'd. 2 yrs + COBOL exper as proj. leader, D.C.I. of major business systems. On line programming, Burroughs 2800. Must effectively interface with division personnel. Light travel. Annual bonus, excell. Co pd. fringes. \$23,000

MANAGER

DIAGNOSTIC PROGRAM

BS,MS., EE,ME. 10 yrs. + exper in applied engineering of digital logic, circuit design and mfr. Skilled in Assembly Lang. Supervise dept. programmers and interface with Engrg.-operations. \$35,000

DIRECTOR, DATA PROCESSING

Degree plus. Must 12-15 yrs. exper. plan, design, produce in mgmt positions. Interface and communicate with upper mgmt. Function independently in very organized environment. HW 6620-IMS, DATABASE. with Honeyw. Minis. Excellent benefits. \$40,000

SYSTEMS & PROGRAMMING MGR.

Degree plus. 5-7 yrs. exper. with 2 yrs in supervisory position-V/W communications needed. HW NCR Criterion, VRX, TOTAL, TICS, Large POS network. COBOL DB/DC. Retail exper. \$30,000

Leon Stief

ROBERT HALF
of San Antonio, Inc.
First National Bank Bldg. #340
San Antonio, TX 78201
(512) 736-2467



BALTO/ WASH

SOFTWARE MANAGER

Responsible for the Software Systems of a new Data Center including software selection & implementation. BS or Masters in Comp Sci & large IBM operating systems design exp. req'd. The corporation is extremely progressive offering excellent salaries and benefits plus relocation and interview expenses are covered. 35K

ROBERT HALF OF BALTIMORE

217 The Quadrangle,
Baltimore, MD 21210
301-323-7770

ROBERT HALF

of Washington
7316 Wisconsin Ave.,
Washington, DC 20014
301-652-1960

NEW ORLEANS

PROGRAMMER/ANALYST

Multi million dollar international corp. Opening due to expansion. 3+ yrs. COBOL OS/MVS/TSO bkgd. Relo Pd. To \$20K

PROGRAMMER

Old, well established local firm. Excellent 370 shop. Rapid growth. 2+ yrs. COBOL. Tech bkgd. Excellent benefits. Relo Paid. To \$25K

SYSTEM PROGRAMMER

State of the art shop. 2 yrs system prog exp. SVS or MVS. CICS or IMS. NCP helpful. Relo Paid. To \$20K

PROGRAMMERS

COBOL / RPG / PL1 / Assembler/ NEAT 3. 1+ yrs. applications exp. Relo Paid. To \$20K

Jerre Brown

ROBERT HALF
of New Orleans, Inc.
135 St. Charles Ave. #1020
New Orleans, LA 70130
(504) 524-3773

NEW YORK

BAL

Gain experience in CICS with this ON-THE-JOB TRAINING position. 2+ years BAL applications programming experience. Aid in development and enhancement of commercial applications. A professional environment where you will become technically current. \$27,000

COBOL

Newly created position offers opportunity to learn IMS and TSO in 3033 dual 370/168 environment. 2+ years COBOL programming, either OS or DOS, with experience in design through implementation. Develop and implement new systems. Substantial growth potential and 4 WEEKS VACATION. \$25,000

Prestige and challenge are the keywords here. 2+ years OS COBOL programming experience with good knowledge of JCL. Diversified responsibilities include development and enhancement programming in dual 370/158 environment. Highly visible. \$25,000

RPG II

Definite management potential in this growing System 3/150 Data Center. 3+ years RPG II programming with CCP experience. All on-line applications include inventory control, order entry, billing. Additional 3/15 being installed as interim until SYSTEM 38 arrives. Good future. \$30,000

NEAT 3

Opportunity for above average recognition with this well respected Savings Bank. 2+ NEAT 3 programming with on-line experience. Hardware is NCR Criterion with all on-line applications Superior advancement potential. \$26,000

Call Peggy Cooper or

Marty Anasio

ROBERT HALF

of New York, Inc.
522 Fifth Avenue
New York, NY 10036
(212) 221-6500

KANSAS CITY

DP MANAGER

Small town Midwestern CPA firm with a 4331 to be delivered in October of 79 seeks a bottom line oriented Data Processing Manager. Excellent opportunity for a manager of systems and programming to move up. Company will also be installing a new data base this year. Salary to \$35,000 plus management incentive program.

DP MANAGER

Publicly held Kansas City manufacturing firm with 4 outstate divisions seeks a manufacturing and distribution professional to take over their data processing installation. The shop is currently a system 34. The manager will be responsible for investigating possible upgrades and selecting a new manufacturing data base. Salary to \$32,000.

SENIOR SYSTEMS ANALYST

200 million dollar plus midwestern manufacturer seeks an analyst to be assigned to their corporate staff. Person will be responsible for investigating divisional data processing needs and recommending appropriate equipment to automate them. Manufacturing and or retail background would be preferred. Position offers excellent visibility to upper management and a chance to move into major DP management within 18 months. Salary to \$30,000.

DP MANAGER

30 year old 10 million dollar midwestern manufacturer seeks their first data processing manager. Person will be in charge of installing a System 34 with terminals in four remote plants and designing an inventory control and order entry system. Job reports to the chief executive officer and pays \$25,000 plus to start.

SENIOR SYSTEMS PROGRAMMER

Kansas City based fortune 100 company with a large 3033 installed seeks a Senior Systems Programmer. Position requires MVS internals, SMP, and JES II experience. Additional training will be provided in IMS support and JES III. Salary to \$28,000.

IPICS EXPERT

Fast tracked Kansas City based manufacturing firm with a systems III model 150 currently installed seeks a proven IPICS professional. Person will be given responsibility for making major modifications to the IPICS package. Company is currently looking at major upgrade to a 4331 or compatible hardware. Person will then be given complete systems responsibility in the manufacturing area. Salary to \$30,000.

DATA PROCESSING SUPERVISOR

Fortune 50 company located in a scenic midwestern town needs a DP supervisor to take over a growing RJE site. Excellent opportunity for a senior PA or a systems analyst to take on their first management responsibility. Company currently transmits to the large MVS environment using IMS. Salary to \$31,000.

George Waterman

ROBERT HALF

127 W. 10th
Kansas City, MO 64105
(816) 474-4583

FREE: Ask for our latest Salary Survey.

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PROGRAMMING

**GO DIRECTLY TO
THE SOURCE!**

Southern California Gas Company, the largest gas distribution company in the United States, has excellent career opportunities for bright and energetic individuals for the following positions:

**SOFTWARE
PROGRAMMER**

This individual will be responsible for the generation and maintenance of the company's operating systems software. The successful candidate must have 2+ years experience in an SVS or MVS environment using IBM utilities, JCL, SMP, and Assembler programming language. Ideal background includes experience in the use of TCAM, VSAM, HASP, and/or RJE system.

**SENIOR COMPUTER
PROGRAMMER**

Responsible for coordinating program COBOL development and maintenance, and modifying or establishing operational job control procedures, works within structured environment. Will provide work direction and technical assistance to computer programmers and assistant computer programmers. Bachelor's degree preferred, plus work experience.

**COMPUTER
PROGRAMMER**

This individual will supply the programming support for all projects including coding, testing and debugging of programs and job control language, and new program logic. Bachelor's degree preferred, plus work experience.

**ASSISTANT COMPUTER
PROGRAMMER**

After completion of company training program, responsibilities include writing and testing computer programs which implement and support new and existing data processing systems applications. Minimum requirement Bachelor's degree.

If you are looking for career growth opportunity, complemented by an excellent salary and benefit package, please send resume, salary history and transcript to:

Berlinda Fontenot
Professional Employment
Representative
SOUTHERN CALIFORNIA
GAS COMPANY

P.O. Box 3249
Terminal Annex
Los Angeles, CA 90051

Equal Opportunity Employer M/F



PROGRAMMER/ANALYSTS
U.S. DOLLARS
20,000 — 25,000 PLUS

Housing, Car and Medical Services
Furnished, Children's School Tuition Assistance.
Mid-East heavy equipment distributor has openings for two qualified Programmer/Analysts with min. 4 years experience in COBOL, IBM 370 or MCR 8800. Preferably with DB/DC exposure. Location Jeddah, Saudi Arabia, modern cosmopolitan Red Sea city.

Send resume and personal details to

CW Box 2106
787 Washington St.
Newton, MA 02160

SYSTEMS ANALYST

Major Southwestern university has an opening for a Systems Analyst with administrative systems experience. Degree and two year's systems/programming experience preferred. Salary competitive; excellent benefits include tuition assistance and one month vacation. Send resume to:

Wendy West
Personnel Office
Texas Christian U.
Fort Worth, TX 76129
(817) 921-7790

TCU IS AN EQUAL OPPORTUNITY/
AFFIRMATIVE ACTION EMPLOYER

**Data Processing Professionals**

Immediate openings available in Dallas for both experienced and entry level applicants. Positions require a 4-year college degree and permanent U.S. residency or U.S. citizenship. Entry level positions require a major or minor in Computer Science.

**General Business Applications
Programmer/Analysts**

Design, develop, and implement systems in support of worldwide general accounting, financial planning, cost accounting, personnel, facilities and marketing functions. Experience with IBM 370, minicomputers, IMS, COBOL, or DL/1 applications preferred.

Manufacturing Systems Programmer/Analysts

Design, develop, implement and support shop tracking, production planning and quality tracking applications for worldwide manufacturing systems. Experience with IBM 370, minicomputers, COBOL, PASCAL, IMS or DL/1 applications preferred.

Scientific Applications Programmers

Develop and support computer aided design and interactive graphics applications. Experience with IBM 370, minicomputers, COBOL, FORTRAN, PASCAL, data base management, numerical methods and structured programming preferred.

Data Base Analysts

Design, develop and support IMS data bases and support programmers with consultation, debugging and design assistance. 3-5 years experience with DL/1 applications programming and IMS data base design required.

MVS/JES 3 Operating Systems Internals

Modify and troubleshoot IBM operating system. 3-5 years experience with IBM operating systems and recent experience with MVS/JES 3 or TSO.

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Coordinate manufacturing, planning, control systems, installation and implementation for international semiconductor manufacturing sites. Interface with management, users and systems staffs. Responsibility in technical design. Periodic overseas travel. 2-5 years strong technical and applications experience required. IMS, COBOL, data base management and distributed systems knowledge preferred. Must be self starter with good interpersonal skills.

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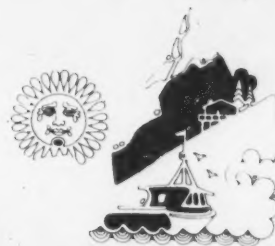
If you wish to discuss these opportunities working in a challenging professional environment, call John Heft collect at (214) 238-3246. Or send your resume in confidence to John Heft/P.O. Box 2103/Richardson, TX 75080.

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These are primarily ANSI X3.9 FORTRAN systems. Structured programming experience is highly desirable. Candidates should be available for some travel.

Most of these positions require an appropriate degree. U.S. citizenship required.

We will be in Washington, D.C. during the Federal Computer Conference, November 6-8, 1979. Call U.D. McDonald at (202) 337-4634 to schedule a convenient local interview.

If unable to call, send resume to Employment Department, P.O. Box 504, Dept. CW-115, Sunnyvale, CA 94086. We are an equal opportunity affirmative action employer.

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Candidates must have a Master's Degree in business, mathematics, computer science, or a related field, with 6 to 12 years of data processing experience, and at least 6 years in administrative/management capacities. Experience with both administrative and academic data processing in the higher education environment is preferred. Equivalent training and experience is acceptable.

Submit resume, including salary requirements, by no later than November 26, 1979 to: Mrs. Marilyn Seeley, Executive Secretary, Office of Vice President for Business Affairs, Ithaca College, Ithaca, New York 14850

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We have openings in the U. S. divisions listed below for entry-level and experienced software engineers. When you send your resume, indicate the area of technology that interests you most, as well as your divisional or geographic preference.

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ITT Avionics is involved in a wide diversity of areas including electronic defense . . . communications . . . navigation/identification. Software professionals have the opportunity to stay with a project from start to finish and be involved in integration. Openings at all levels. Bachelors preferred in Electrical Engineering, Physics or Computer Science (experience in lieu of degree considered). At least 3 years real-time Assembly language programming desired. Responsible for software design, coding, testing and integration of the software program into the hardware systems. Experience should include one or more of the following areas: E/W Computer Systems; Multi-Computer System Architecture; Firmware Coding. Positions are in Nutley located in suburban northern New Jersey.

Business Communications Division

The ITT Business Communications Division is currently developing advanced communication systems which will encompass PABX functions and data switching capabilities. Add on modules will provide data processing facilities for implementation of the "Office of the Future".

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ITT Courier

ITT Courier produces a full line of multi-microprocessor software-based computer display terminal and data communications products, and is currently the largest non-IBM producer of 3270-type devices. At the metropolitan Phoenix software engineering center, ITT Courier is developing state-of-the-art real-time, Assembly language software that will provide form and function to future product offerings. Software development areas include: SNA, SDLC, BSC, and IBM channel protocol communications software; real-time, multi-tasking operating systems; software development tools; smart terminal software; intelligent terminal software; and support/diagnostic software.

Software engineering openings exist at all levels at our facilities in Tempe, Arizona; West Palm Beach, Florida; East Rutherford, New Jersey.

Defense Communications Division

ITT Defense Communications Division is involved in research, development and manufacture of sophisticated communications equipment such as digital telephone circuit switching, message switching, narrow band digital voice processing, radio transmission and satellite communications and navigation. ITTDCD has been very successful in obtaining contracts in all the aforementioned technology areas during the past few years due in large part to an **aggressive internally funded research and development program**. We are interested in engineers (both in equipment and computer software design) to work in digital communications such as voice processing, circuit switching, message switching and radio transmissions . . . at our Nutley facilities in suburban New Jersey.

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PROGRAMMER/ANALYST

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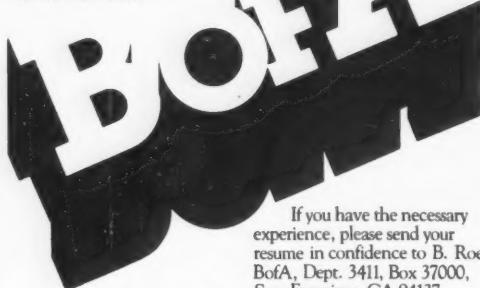
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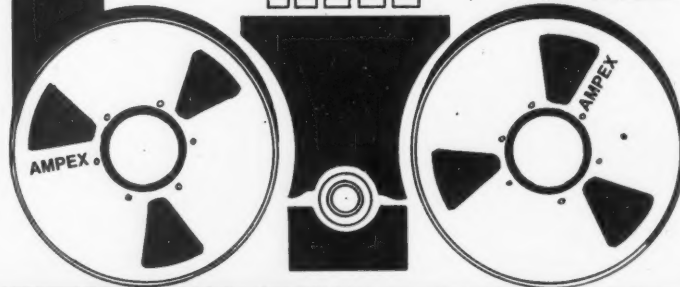
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If you cannot reach our regional managers, contact Bill Beattie, Perkin-Elmer, Computer Operations, 106 Apple Street, Tinton Falls, New Jersey 07724.

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SYSTEMS PROGRAMMER

We are offering an opportunity for an experienced systems programmer to work in a large sophisticated IMS DB/DC shop operating under MVS. We offer a challenging work environment, training, and good salary and benefits, including three weeks of vacation the first year. Applicants should have systems programming experience operating under OS/VS or MVS. Please send resume and salary requirements to:

Nancy J. Stone
REJIS Commission
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Newton Lower Falls, MA 02162

817-965-9700

Executive Search and Placement

Data Processing

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San Diego

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This is a career opportunity. IVAC offers a competitive benefit package. Salary open to \$20K.

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(713) 626-4100

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Mid 20's
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NILES, CHICAGO

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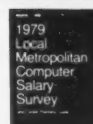
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Hartford	203/522-6590	Greensboro NC	919/294-6550
New York (Midtown)	212/736-7445	Houston	713/626-8705
New York (Wall Street)	212/962-8000	Miami	305/624-3536
Long Island	516/364-0900	New Orleans	504/561-6000
White Plains NY	914/683-9300	Phoenix	602/258-9333
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Valley Forge PA	215/265-7250	Los Angeles	213/386-5500
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Washington DC	703/790-5610	Torrance CA	213/540-7500
Midwest		Palo Alto	415/856-0600
Chicago	312/782-0857	Portland OR	503/223-6160
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Oak Brook IL	312/986-0422	San Francisco	415/434-2410
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Kansas City MO	816/474-3393		
Milwaukee	414/277-0345		
Minneapolis	612/544-3600		
Pittsburgh	412/261-6540		
St. Louis	314/231-4880		
Clayton, MO	314/862-3800		
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If unable to call, write:
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721 Enterprise
Oak Brook, Illinois 60521
(When writing, please be sure to indicate home address and current position title.)

PROGRAMMER

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DATA PROCESSING

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Our progressive 420-bed hospital is seeking a people-oriented Systems Analyst to take full control of our systems design and implementation for specific projects. This major responsibility position involves the coordination & organization of certain hospital processing systems and the maintenance of various computer master files. Other duties include analyzing and preparing cost of assigned projects, systems and project documentation.

Minimum requirements of this high-visibility position are a 4 year degree, preferably in computer science/business or equivalent job experience of at least 3 years, ideally in a hospital environment.

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CCI offers fast personal growth in a young, fast track company; exciting exposure to data communications; competitive benefits including free medical, dental, vision and life insurance and excellent starting salaries.

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Requires experience with IBM TP protocols, PARS, ACP or SNA. Will design, code and debug in Assembler or Pascal. Based in California.

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Requires marketing tech support experience. Will install and troubleshoot software in sophisticated networks in the customer environment. Knowledge of backend and frontend, JCL, syseng, dump reading. Some travel involved. Openings in Chicago, Los Angeles, Quebec & Montreal.

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Requires 3 years of mini experience; knowledge of data communications or IBM channel experience. Will install, maintain & troubleshoot hardware on site. National openings.

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Directs and controls CCI products from design to release. Requires IBM frontend experience plus product management skills.

Electrical or Mechanical Engineers

Microprocessor background required to work in new product development. Experience with qualifying agencies (UL) and test procedures helpful. California based.

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Call (800) 421-1178 TOLL FREE
for more information
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Computer Communications, Inc.

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(213) 320-9101

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Applicants must have 6-10 years experience in Systems and/or Programming. Must have participated in all phases of System Development and be able to interface with user personnel and with senior management.

H-600/6000/66, COBOL, IDS, TDS and GMAP desirable but not mandatory. Experience in Teleprocessing and On-line Data Base applications would be an asset. A four year college degree is preferred. Excellent salary structure and fringe benefit program.

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We are expanding our Midwest and Southwest Regional offices. We are looking to fill many career positions located in CHICAGO, HOUSTON, TULSA and DALLAS. We would like to continue staffing these new offices as well as increase our already existing staff in New York, Atlanta, Miami, San Francisco, Denver and North Carolina with EDP professionals who:

1. Have a strong drive to succeed.
2. Have the ability to interact with top level management while handling complex assignments for our client companies.
3. Enjoy the challenge that new assignments offer every 4-6 months.

We are currently seeking professionals for any of the above locations mentioned that possess experience with any major manufacturer's hardware. As a plus, if you have also had experience in any of the following areas, we are willing to PAY PREMIUM SALARIES, as well as relocation expenses.

IF YOU ARE A:

**SYSTEMS ANALYST
PROGRAMMER**

**PROGRAMMER/ANALYST
SYSTEMS/PROGRAMMER**

With design or implementation experience in any of the following:

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**ANY MINI
OS INTERNALS
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We seek a dynamic, aggressive and sales oriented businessperson who possesses wide exposure in the Data Processing Services industry. Sales and Management experience in the Software Services industry will be considered a definite plus for this unusually challenging assignment. The executive selected will be required to provide both sales and management services to top level management of Fortune 500 firms. This Regional Director will be responsible for the growth of the Houston office, as well as the development and management of District and Branch offices throughout the Southwest.

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or

Nov. 7 & 8 at

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Nov. 14 & 15 at

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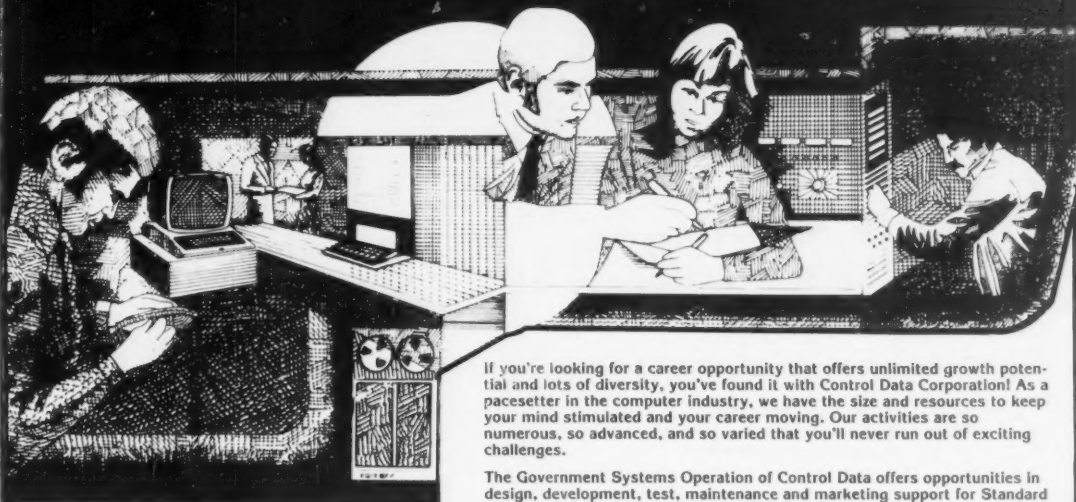
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This technical position supports the field marketing function for Control Data standard hardware/software products.

Position requires 3 years' experience in support of CDC CYBER systems and support products. You must have CDC CYBER series hardware/software architectural knowledge and experience in maintenance of NOS or NOS/BE operating systems. You should enjoy the challenge of meeting and dealing with technical and management personnel; be willing to work flexible hours; and travel as required.

Experience with government sponsored programs and knowledge of MIL-SPECS is highly desirable. Your responsibilities will include: conducting product presentations; writing proposals; bench-mark preparation and execution; cost/performance trade-off studies; System configuration; and System requirements analysis.

Sr. Applications Design Analyst—CAD/CAM (Openings in Seattle, WA)

This is an opportunity for an Analyst skilled in the design and development of CAD/CAM applications. The successful candidate will become involved in developing an industry standard CAD/CAM and will work in the data base management area of this development.

The position requires experience in computer aided design; geometric modeling; and data base design. Experience on CDC CYBER systems is desirable.

Responsibilities will include Product analysis and selection; productization; quality assurance; customer training; and product support.

Systems Test Engineers (Openings in Sunnyvale, CA)

The emphasis in this position is on software testing. Some hardware test or maintenance background and 2 years' test experience is desirable.

You will develop, conduct and evaluate systems test procedures and results in support of hardware and software development engineered for scientific applications. You will utilize state-of-the-art software and hardware development tools and participate in: system requirements analysis; test planning; design and implementation of system tests; proposal preparation; and evaluation of test results.

Position requires software experience at the user level in one or more of the following applications: signal processing; simulation; real-time; or data base management. You must have a working knowledge of MIL-SPECS as they pertain to development and test of software systems. Your coding background should include both ASSEMBLY and higher level languages. You must have the ability to isolate, define and resolve system software problems and possess some experience in hardware/software integration.

This position offers a variety of duties and applications as well as opportunity for rapid advancement.

Control Data Corporation offers an excellent salary and comprehensive benefits package including: flexible work hours; medical, dental and life insurance; paid vacation and sick leave policy; 100% tuition reimbursement; short and long term disability; and relocation assistance. If you are unable to attend our Open House in Los Angeles, please submit your resume to:

Mr. Ron Schaller
Government Systems Operations
Control Data Corporation
215 Moffett Park Drive
Sunnyvale, CA 94086

Team Leader Systems Development (Openings in Sunnyvale, CA)

This position will direct the efforts of systems engineering professionals. The Systems Development function is currently involved in the development of a state-of-the-art conversion of a complex satellite and ground system configuration.

The successful candidate should have a record of significant technical achievement in the development of Aerospace/Scientific data processing applications and be experienced in: Real-time systems design; telemetry systems design; command and control; Algorithm development; and airborne processors. You must have a demonstrated ability to lead technical projects and team members.

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Position requires a person knowledgeable in operating systems support and development on large scale processors. This position is in support of customers utilizing the Control Data SCOPE 2.1 operating system on a 7600 CPU. The system is utilized in a real-time application involving simulation of rotary winged aircraft and includes the extensive design and implementation of new features to the real-time operating system.

Your experience should include a successful record of operating systems development or site support on large-scale processor systems, preferably Control Data 7000 or lower CYBER series systems. Experience with real-time operating systems is desirable.

This is a growth position offering extensive direct customer contact in a cordial and challenging work environment.

Systems and Software Engineers (Openings in Sunnyvale, CA)

These positions provide data processing solutions to complex real-time processing and command and control requirements associated with satellite payload and ground systems.

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You will perform analysis of complex hardware/software requirements; configure hardware/software systems per performance requirements; and present solutions to customers.

Marketing Support Analyst (Openings in Sunnyvale, CA)

This technical position will support the field marketing function of Control Data Aerospace products. Position requires experience in: Aerospace applications — command and control systems, simulation systems, attitude/orbit determination; Airborne processors; Microprocessors; microprogramming; Algorithm development for aerospace applications; and knowledge of MIL-SPECS.

Your responsibilities will include: conducting product presentations; writing proposals; bench-mark preparation and execution; cost/performance trade-off studies; System configuration; and system requirements analysis.

Operating Systems Analysts

(Openings in Los Angeles and Sunnyvale, CA and Seattle, WA)

If you have experience in the support of the Control Data CYBER series NOS or NOS/BE operating systems, or other large-scale operating systems, and are interested in providing on-site customer support in a specialized scientific environment, this position will provide a challenging opportunity to apply your skill and initiative. This is a growth position leading to opportunities in development and marketing support.

This position requires a BSEE, BSCE, or related degree and 2 years' experience in operating systems support. You must be an effective communicator and exhibit an interest in increased responsibility. A knowledge of Query/Update 7 DSM 170 product sets and CYBER series hardware architecture is desirable.

Responsibilities include NOS operating system maintenance and modification; Emphasizing development and implementation of enhancements and new features; problem isolation; and user support.

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12:00 noon to 8:00 PM
Saturday, November 10th,
9:00 AM to 12:00 noon

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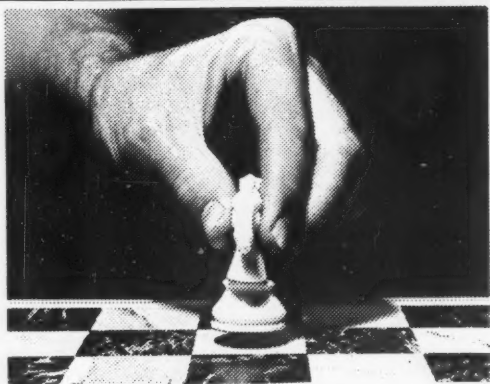
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We have superb salaries with excellent performance incentives, and a well rounded benefits package including health and life insurance, and profit-sharing and retirement.

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Geophysics; Oil & Gas Acct. Reservoir analysis; process control experience. Knowledge of Honeywell systems a plus. College degree.
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Major Houston based financial institution seeks individual with project management exp. 5-7 yrs DP exp. and banking experience. Advanced management opportunities. Profit sharing & good benefits. College degree.
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Major Houston Oil Co seeks individual with IDMS & COBOL experience. Growth oriented firm offering excellent advancement & company benefits. College degree.
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NCR/ South Carolina

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This unique department provides early definition and systems design of future NCR communications products along with initiation; and startup development of new programs. The group is characterized by working in a state-of-the-art software/hardware environment, with opportunities for individual contributions in a systems level scope of design from the conceptual stage to the finished product.

We are currently seeking individuals with a minimum of 5 years experience in software and/or hardware who desire work and have experience in one of the following areas:

- Microprocessor Based Hardware or Software Systems
- Processing Systems
- Operating Systems, High Level Languages and File or Data Management
- Firmware Design
- Communications Products Design and Definition
- Systems Modeling

All our positions are in our beautiful, sunny South Carolina location, close to the seashores and

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If you are seeking a challenging career with a leader in the industry, need a new lifestyle and have the above experience, we'd like to speak with you.

A degree in Engineering, Math or Computer Science is required. For consideration, please send your resume and salary requirements in complete confidence to: Bob Race, Dept. J50, Industrial Relations, Communications Systems Division, NCR Corporation, 3325 Platt Springs Road, West Columbia, S.C. 29169.

NCR

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CORPORATION**

Computer Sciences Corporation, the world's leading independent company in the Information Sciences, has been, consistently, in the forefront for the development of high-performance computer software systems. The System Sciences Division of computer software systems. The System Sciences Division of CSC is involved in some of the most exciting and enviable Space Science programs in the area of state-of-the-art Information Systems. We offer OPEN OPPORTUNITY for career advancement. Working in an atmosphere of a broad range of technical programs, your skills will continually increase and develop as your work with multidisciplinary teams of software specialists.

Current assignments with the NASA Goddard Space Flight Center require personnel with a B.S. or advanced degree in Meteorology, Mathematics, Physics, Computer Science or Electrical Engineering, with scientifically oriented software skills to work on programs such as Mission Support, Science and Applications, and the Goddard Real-Time System.

We are seeking individuals with experience in one or more of the following areas:

HARDWARE: IBM 360/370/3033, PDP-11, VAX 11/70, UNIVAC 1100, SEL 32/55, SIGMA 5, AMDAHL 470/V6, INTEL 8080/8085, VARIAN, INTERDATA and MODCOMP.

COMPUTER APPLICATIONS: System Generation and Maintenance; FORTRAN, Assembly or PL/1 Programming; Computer Architecture & Design; Distributive Network Systems; Scheduling and Resource Allocation; Real-Time Command/Communication Systems; Real-Time Operating Systems; Data Base Management; Modeling & Simulation.

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We offer competitive salaries and a comprehensive benefit program. But most importantly, you will have the opportunity to apply your innovative capabilities to the challenges we'll be confronting together.

CALL OUR DIRECTOR OF PROFESSIONAL STAFFING:

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Or send your resume to Dept. CW-513

System Sciences Division
8728 Colesville Road, Silver Spring, Md. 20910

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DTSS Incorporated participated in the joint development of the Dartmouth Time Sharing System with Dartmouth College. The company licenses an expanded version of this operating system to its customers, and also offers interactive time sharing, customer technical support, education and training, consulting and contract programming services.

DTSS Incorporated, founded by Dartmouth College in 1972, is now a wholly-owned subsidiary of Metropolitan Life Insurance Company. Customers include international industrial organizations, government agencies, academic institutions, and computer service companies worldwide.

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Duties will include assisting in the design, development and implementation of new application architectures, refining interfaces to existing message control systems, and assisting in the development of application specifications. Candidates should have 1-3 years experience in application development and possess a degree in computer science.

Data Base Administration Analysts

Analysts in this area will assist in the design, development, implementation and support of data bases using DMS-II. In addition, analysts will interface with the internal auditing function. Candidates should have 1-3 years experience in Data Management Systems and a degree in business or computer science.

We offer an excellent salary and comprehensive benefits, including relocation assistance and professional training through our educational centers. Please forward a detailed resume including salary requirements to:

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Salary range \$18,400 - \$27,332. Please send resume to National Center for State Courts, Sec. CAT, 300 Newport Avenue, Williamsburg, Virginia 23185 EEO/MF

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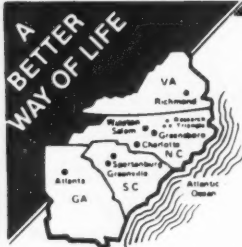
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Position requires BSEE or equivalent plus design level experience in computer hardware and/or software systems.

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Audit responsibilities will involve computer systems for our corporate, domestic, and international operations. Will recommend improved methods of operating and administrative control. Evaluate computer systems and advise on improving operational control and effectiveness. Bachelor's in business desired plus 5 years' experience as Analyst Programmer with exposure to project management and systems development. Familiarity with on-line systems, data base and data communication systems desired.

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Analyst will perform computer service level monitoring by writing programs, analyzing and evaluating performance data, producing reports and management summaries, and providing data for capacity planning.

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DOS COBOL Prog. Analyst	\$23,000	Systems Engineer	\$26,000
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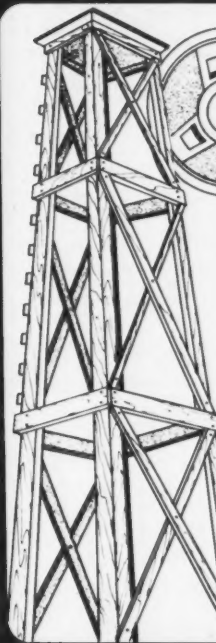
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MGR SYSTEMS PROGRAMMING COBOL, JCL, IBM lge scale, solid tech skills req'd by hvy mfg. CICS+ DL1+	TO 37K	SYSTEMS MGR Sys analyst or project ldr exp & mfg bkgd, user contact+	TO 28K
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MGR WAREHOUSE OPERATIONS Computerized warehouse exp. mfg bkgd+ inventory control+	TO 34K	SUPVR WORD PROCESSING Mini to on-line conversion exp, solid work processing bkgd req'd Insurance+	TO 22K
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Applications should include: (1) a letter of application, (2) a resume, and (3) three references. Closing date is November 30, 1979, but may be extended until all positions are filled. Positions open Jan. or Aug. 1980.

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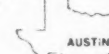
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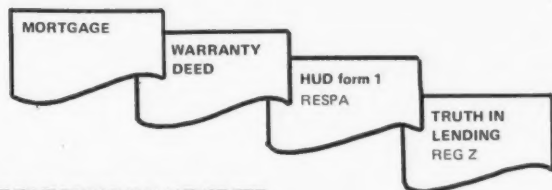
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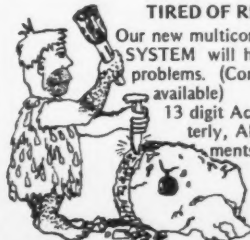
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witty-one-liners
yearning
to breathe free.**



Every year, as all you button freaks know, Computerworld distributes tens of thousands of buttons (at no cost, we like to point that out) at NCC, the Computer Expos and other trade shows across the country. A whole generation of computer people have come to look for these buttons, and they have become a tradition in the industry.

This year, we're going to give you a chance to participate in the tradition. We're looking for good button suggestions—funny, relevant and at least moderately clean—for consideration by our experienced panel of judges. (Examples of buttons we've used are shown.) As many as six suggestions will be chosen by our judges (based on criteria known only to them), and if your entry is among those picked, you will receive a certificate of appreciation suitable for showing off to your friends.

In addition, all the people who submit winning entries (including all duplicate entries) will be thrown into a hat (or at least their entries will) and six lucky winners will be drawn more or less at random (we never said the judges were fair). These six lucky souls will receive a free hand-held computer game valued at well under \$100 if we can do it.

You may *not* enter as many times as you like because we know you have computers and can run off huge numbers of entries which will drive us crazy.

So only two entries are permitted per person and all entries must be received on the official order form or a copy thereof. All decisions of the judges are considered final, and no representation as to their competence, skill or fairness are being made. Deadline for entries is November 15th 1979 in our offices in Newton.

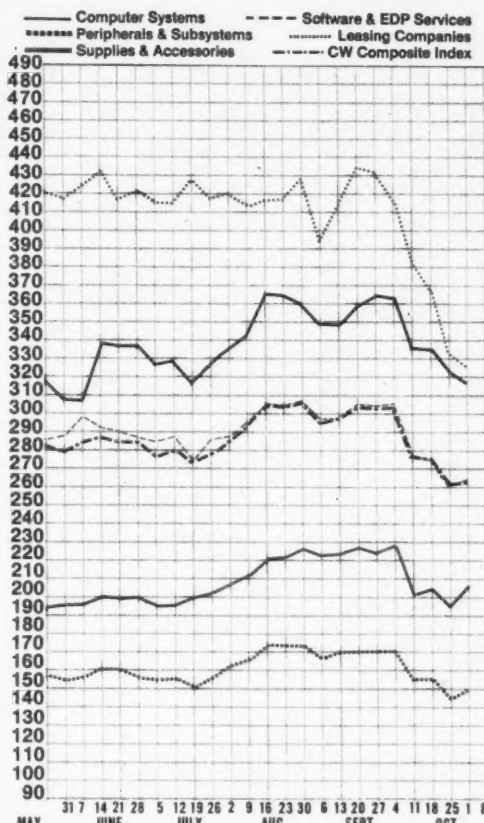


Yes, I'd like to enter Computerworld's ridiculous button contest. I hope your judges can read. Here is my entry (if you have more than one, please put them on separate forms).

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 31, 1979

All statistics compiled,
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	1978-79	CLOSE	WEEK	WEEK
	RANGE	OCT 31	CHNGE	CHNGE
(1)		1979		
COMPUTER SYSTEMS				
A AMDAHL CORP	17-69	17 7/8	+ 1/4	+1.4
N BURROUGHS CORP	59-87	78	- 3/8	-0.5
O COMPUTER AUTOMATION	9-44	8 3/4	-1 1/2	-14.6
N CONTROL DATA CORP	23-51	44 5/8	+1	+2.2
O CRAY RESEARCH INC	8-45	37	- 1/4	-0.6
N DATA GENERAL CORP	42-74	50 5/8	-10 7/8	-17.6
N DATAPoint CORP	34-89	80 3/8	- 3/8	-0.4
N DIGITAL EQUIPMENT	39-66	61 3/4	+1 1/4	+2.0
N ELECTRONIC ASSOC.	2-13	6 3/8	+ 1/4	+4.0
A ELECTRONIC ENGINEER	9-19	14 5/8	- 1/8	-0.8
N FOUR-PHASE SYSTEMS	19-44	36 1/4	+2 1/2	+7.4
N FOXBORO	28-44	36 3/4	+ 1/4	+0.6
O GENERAL AUTOMATION	7-26	14 3/8	+ 3/4	+5.5
O GRI COMPUTER CORP	1-3	5/8	- 1/4	-28.5
N HEWLETT-PACKARD CO	24-59	52 3/4	- 3/8	-0.7
N HONEYWELL INC	43-83	72	+ 1/8	+0.1
N IBM	62-321	62 3/8	- 1/8	-0.1
O MANAGEMENT ASSIST	9-29	18 1/2	+2 1/4	+13.8
O MANUFACTURING DATA S	9-33	28 1/4	- 1/4	-0.8
O MICRODATA CORP	10-34	31 1/4	0	0.0
O MINI-COMPUTER SYST	3-8	2 1/2	- 3/8	-13.0
O MODULAR COMPUTER SYS	7-18	9 7/8	-2 1/8	-17.7
N NEC	37-81	62	-1 1/8	-1.7
N PRIME COMPUTER INC	9-22	16	+ 1/4	+1.5
N PERKIN-ELMER	17-34	29 7/8	+1 1/8	+3.9
N SPERRY RAND	33-52	43 1/4	- 1/2	-1.1
A SYSTEMS ENGR. LABS	11-24	12 1/2	+ 3/8	+3.0
O TANDEN COMPUTERS INC	13-37	33 1/4	+1	+3.1
A WANG LABS.	6-25	22 1/2	+1 5/8	+7.7
LEASING COMPANIES				
O BOOTHIE COURIER CORP	13-21	15 3/4	+ 3/4	+5.0
O COMDISCO INC	3-21	11 3/4	-1	-7.8
A COMMERCE GROUP CORP	1-1	3/8	0	0.0
A COMPUTER INVESTS GRP	1-7	2 1/4	0	0.0
O CONTINENTAL INFO SYS	3-15	2 3/4	+1 1/8	+4.3
N DATACOM RE-ITAL	1-4	2 5/8	-1/8	-4.5
A DCL INC	3-6	4 3/4	+ 1/4	+5.5
N DPF INC	4-14	7 3/4	+ 1/8	+1.6
N ITEL	4-36	5	-1	-16.6
N LEASCO CORP	24-55	46 1/2	- 1/2	-1.0
O LEASPCO CORP	1-4	1/8	0	0.0
A PIONEER TEX CORP	2-7	2 1/2	- 1/8	-4.7
N U.S. LEASING	12-20	12 5/8	+ 1/8	+1.0

	1978-79	CLOSE	WEEK	WEEK
	RANGE	OCT 31	CHNGE	CHNGE
(1)		1979		
SOFTWARE & EDP SERVICES				
O ADVANCED COMP TECH	1-2	7/8	0	0.0
O ANACOMP INC	8-24	18 3/4	+2 1/4	+13.6
A APPLIED DATA RES.	8-17	8 7/8	- 1/8	-1.3
N AUTOMATIC DATA PHOC	24-40	34	+1 1/8	+3.0
O COMPU-SERV NETWORK	3-16	11	+ 1/4	+2.3
O COMPUTER HORIZONS	1-9	3 3/8	+ 5/8	+22.7
O COMPUTER NETWORK	3-16	4 5/8	- 1/2	-9.7
N COMPUTER SCIENCES	8-17	14 3/4	+ 5/8	+4.4
O COMPUTER TASK GROUP	1-7	6 1/4	0	0.0
O COMPUTER USAGE	2-4	1 1/8	0	0.0
O COMPUT AUTO REP SVC	4-10	5 3/8	- 1/4	-4.4
O COMSHARE	8-26	14 3/4	+ 1/4	+1.7
O CULLENHAW CORP	18-33	21	+2 1/4	+12.0
O DATA DIMENSIONS INC	1-9	1 1/8	- 1/2	-30.7
O DATATAB	1-4	1	0	0.0
N ELECTRONIC DATA SYS.	15-28	22 1/4	+ 1/4	+1.1
O INSYTE CORP	1-3	1 1/8	0	0.0
O IPS COMPUTER MARKET	2-3	3	0	0.0
O KEANE ASSOCIATES	3-6	5 1/4	0	0.0
O KEYDATA CORP	1-4	3 3/8	0	0.0
A LOGICON	10-19	13	0	0.0
O NATIONAL DATA CORP	7-16	13	+ 3/4	+6.1
A ON LINE SYSTEMS INC	12-30	22	+ 3/4	+3.5
N PLANNING RESEARCH	4-10	5 1/4	- 1/4	-4.5
O PROGRAMMING & SYS	1-11	5	0	0.0
O RAPIDATA INC	3-7	4 5/8	+ 1/2	+12.1
O REYNOLDS & REYNOLD	18-36	28 3/4	+ 3/4	+2.6
O SCIENTIFIC COMPUTERS	3-9	7 7/8	+ 3/8	+5.5
N TMSHARE INC	10-46	42	+3 1/4	+8.3
A UBS SYSTEMS	3-8	6 5/8	+ 1/4	+3.9
N WLY CORP	1-7	4 1/2	0	0.0
PERIPHERALS & SUBSYSTEMS				
N ADDRESSOGRAPH-MULT	13-32	13 5/8	- 1/4	-1.8
N AMPLEX CORP	10-19	16 1/8	+ 3/4	+4.8
O ANDERSON JACOBSON	3-12	9 5/8	+ 1/8	+1.3
N APPLIED DIG DATA SYS	6-22	6 1/4	- 1/2	-7.4
O REMVIEW INT'L	3-7	3 3/8	+ 1/4	+0.0
A ROLTECH-RESEARCH & NEW	6-17	14 1/8	+ 1/4	+1.8
N RUNNER-NAND	10-49	23 1/2	+ 1/2	+2.1
O CAMBRIDGE MEMORIES	2-9	1 3/4	- 1/2	-6.6
O CENTRONICS DATA COMP	10-54	44 1/4	-3 3/8	-7.0
N CONITRONICS	1-4	2	0	0.0
O COMPUTER COMMUN.	6-18	5 3/4	+ 3/8	+7.5
O COMPUTER CONSOLES	4-16	13 3/4	+ 1/2	+3.7
A COMPUTER EQUIPMENT	3-6	4 3/8	+ 1/8	+2.9
O COMPUTER TRANSCIVER	1-5	3	+ 1/8	+4.3
A COMPTON SYSTEMS	3-8	38 3/8	+ 7/8	+18.1
N CONRAC CORP	13-26	12 7/8	- 5/8	-4.6

	1978-79	CLOSE	WEEK	WEEK
	RANGE	OCT 31	CHNGE	CHNGE
(1)		1979		
SUPPLIES & ACCESSORIES				
A DATA ACCESS SYSTEMS	0-10	6 1/4	+ 1/4	+4.1
A DATA PRODUCTS CORP	13-25	16 3/8	+ 7/8	+5.6
O DATUM INC	2-6	2 1/8	0	0.0
O DECISION DATA COMPUT	2-6	2 1/2	+ 1/4	+11.1
O DELTA DATA SYSTEMS	1-1	3/4	+ 1/8	+20.0
O DEKUMATION INC	6-34	16 7/8	+ 3/4	+4.6
O DATARAM CORP	6-32	23 1/2	-1	-4.0
N ELECTRONIC M & M	3-9	2 1/8	- 1/4	-8.0
O FARRI-TEK	1-2	2 1/2	0	+12.5
O GENERAL COMPUTER SYS	1-3	2	- 1/4	-11.1
O GENERAL DATACOMM INC	9-21	15	+ 1/4	+1.6
N HAZELTINE CORP	10-18	15 5/8	- 3/8	-2.3
N HARRIS CORP	17-36	31 1/2	+2 1/8	+7.2
O INFOTEC INC	2-11	1 3/4	+ 1/8	+7.6
O INFORMATION INTL INC	7-12	8 1/2	+ 1/2	+2.2
O INFOTON	1-3	2 1/2	- 1/8	-4.7
O INTEL CORP	20-65	61 3/4	+2 1/2	+4.2
O INTERSIL	7-29	28 5/8	+1 1/8	+6.0
A LUNDY ELECTRONICS	4-8	5 1/4	- 3/8	-6.8
O MSI DATA CORP	6-19	7 1/2	+1	+15.3
N MEMOREX	10-59	19 7/8	- 1/8	-0.6
N MINIMARK DATA SCI	6-15	11	+ 1/4	+2.3
O OMR	2-8	7 1/2	- 1/2	-6.2
O PARADYNE CORP	9-22	19 3/4	+1 1/4	+6.7
O PENRIL CORP	5-12	10 3/8	+ 5/8	+6.4
N PERTEC CORP	8-17	15 5/8	+ 1/8	+0.8
A POTTER INSTRUMENT	2-2	1 3/4	0	0.0
O RECOGNITION EQUIP	5-13	6 1/4	+1 1/4	+25.0
O SCAN DATA	1-5	1 5/8	0	+3.8
N STORAGE TECHNOLOGY	14-46	15	+1	+7.1
O T BAR INC	11-25	19 1/2	+1	+5.4
O TALLY CORP.	6-14	13 5/8	+ 1/8	+0.9
A TEC INC	0-13	6	- 7/8	-12.7
N TEKTRONIX INC	33-61	54 7/8	+ 1/8	+0.2
N TELEK	3-9	3 3/8	+ 1/8	+3.5
O TESSDATA SYSTEMS CP	4-26	8 1/2	+ 1/8	+1.4
O WILTEK INC	1-2	3/8	0	0.0

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